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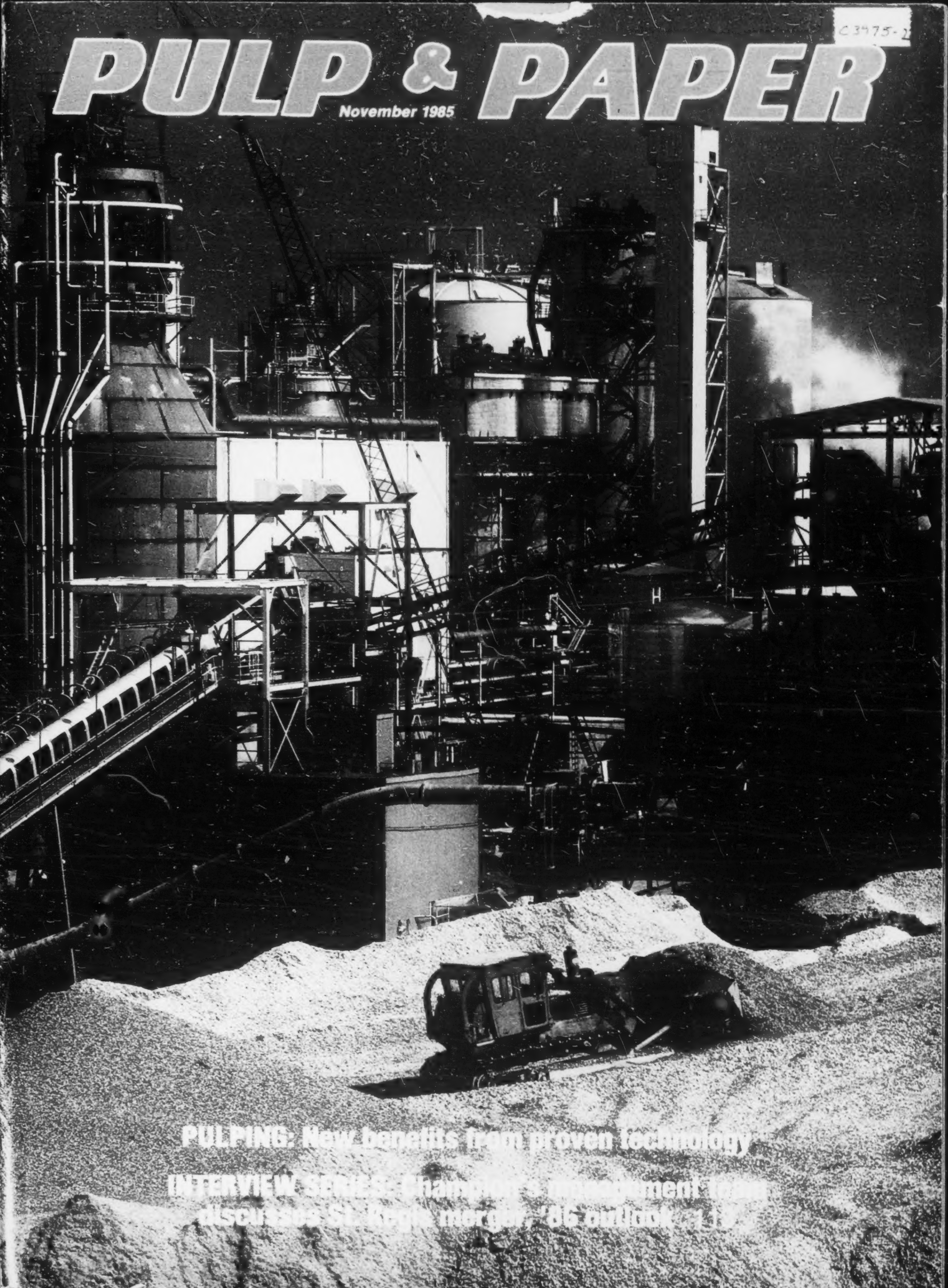
PULP & PAPER

November 1985



PULPING: New benefits from proven technology

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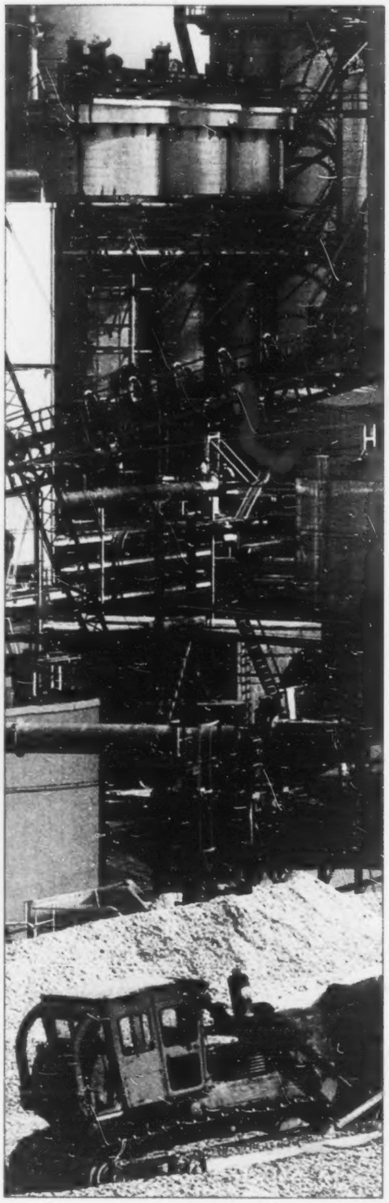

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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Subscriptions & Address Change: Sent without charge in the U.S.A. & Canada (upon written request) to individuals in pulp, paper, and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $45.00 a year in the U.S. All subscriptions to other countries: $65.00 a year, except Europe and Mediterranean, $75.00 (air service included). Single copy, $4.00, except Buyers Guide, $25.00. Photocopies of articles and complete microform volumes available through University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106.

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Send subscription correspondence to:
Circulation Department, PULP & PAPER,
500 Howard St., San Francisco, Calif. 94105.
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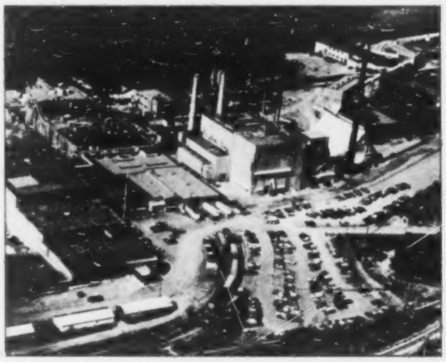

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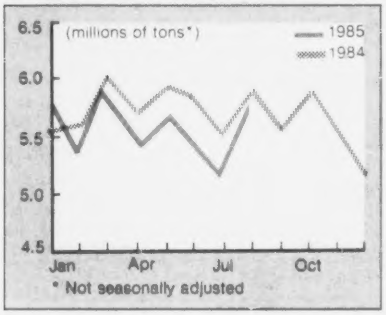
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 5.8 million tons in August, down 0.8% from August 1984, according to American Paper Institute figures. The two-month moving average of seasonally adjusted data showed paper and board production through August at an annual rate of 67.3 million tons, 2.9% lower than last year. Paper continues to make the strongest showing, with a trend rate in August of 34.2 million tons, down 1.6% from 1984. The trend rate for paperboard stood at 33.2 million tons, down 4.2% from last year.

Among major grades, only tissue and uncoated free sheet exceeded last year's mark, rising an annualized 2.1% and 4.0% in August, respectively. Packaging and industrial papers were off 9.1% from last year, while uncoated groundwood fell 8.6%. Kraft paperboard dipped 6.1% in August, with production for export down 23.8%. Corrugated box shipments were down 2.9% compared to 1984, the Fibre Box Assn. reported.

Canadian newsprint shipments declined 1.3% in August to 742,000 metric tons, the Canadian Pulp & Paper Assn. said. Operating rates for the month stood at 94%. Pulp shipments for the month dropped 5.2%, while operating rates climbed to 90%. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Aug.	456	−3.0	5,484	−1.8
Uncoated groundwood (s)	Aug.	132	11.9	1,464	−8.6
Coated paper (s)	Aug.	492	−6.8	6,049	−3.1
Uncoated free sheet (s)	Aug.	840	12.1	9,672	4.0
Other printing/writing	Aug.	111	−5.9	1,338	−9.1
Total packaging and other paper (s)	Aug.	441	−8.3	5,200	−9.3
Tissue	Aug.	427	−1.2	4,949	2.1
Total paper	**Aug.**	**2,899**	**−0.1**	**34,156**	**−1.6**
Unbleached kraft paperboard	Aug.	1,413	−7.6	16,430	−6.1
Semichemical medium	Aug.	460	2.4	5,072	−3.1
Bleached paperboard	Aug.	352	—	3,992	−3.0
Recycled paperboard	Aug.	672	4.8	7,674	−1.9
Total paperboard	**Aug.**	**2,897**	**−0.8**	**33,168**	**−4.2**
Total U.S. paper and paperboard output	**Aug.**	**5,796**	**−1.4**	**67,323**	**−2.9**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	July	4,499	−0.6	54,306	−2.6
Market pulp production	July	591	3.7	6,927	1.5
Wastepaper consumption at paper/board mills	July	1,212	−0.6	15,157	−4.6
Pulpwood consumption (cords)	July	7,022	−2.4	86,109	−2.2
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	Aug.	23.167	−2.5	178.605[6]	−0.8
Containerboard inventories at U.S. box plants and mills	Aug. 1	2,820	−0.6		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	July	880	−10.8	11,074	5.5
Imports of Canadian newsprint	July	637	−8.3	9,477[6]	26.8
U.S. paper exports (including products)	July	311	−16.2	3,961	−11.5
Exports of unbleached kraft linerboard	Aug.	164	−23.7	1,728	−23.8
Exports of woodpulp	July	334	19.7	3,883	6.8
Norscan pulp inventories[4]	Aug. 31	1,552	2.6		
Norscan pulp operating rates[4]	Aug.	87%	87%	91%	86%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Aug.	742	−1.3	5,956[6]	—
Operating rates	Aug.	94%	94%	92%	91%
Inventories held by U.S. consumers	Aug. 31	1,553	2.3		
Other paper/board shipments	Aug.	258	6.2	1,997	8.7
Woodpulp shipments (export only)	Aug.	583	−5.2'	4,622[6]	6.0
Operating rates	Aug.	90%	97%	89%	91%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = shipments.

UNBLEACHED KRAFT PAPER:
Withdrawals should keep operating rates high

Grade structure: Unbleached kraft paper (UKP) is normally divided into four end uses: wrapping, bag and sack, shipping sack, and other converting. Bag and sack paper is the largest category, accounting for about 59% of total shipments, followed by multiwall shipping, 24%; other converting, 14%; and wrapping, 3%.

Basis weights for bag and sack paper range from 30 lb to 80 lb/3,000 ft², with the lower basis weights used for small grocery and merchandise bags and 70 lb most commonly used for grocery carryout sacks. Multiwall shipping sack paper is 50 lb or 60 lb. Extensible or air-dried paper may be used for bags requiring strength and toughness.

Production/capacity: UKP shipments remained flat in 1984 at 3.7 million tons but so far this year have been running about 10% below a year ago. The decline in 1985 shipments reflects weak demand in many end uses and the shutdown of four paper machines over the past year. Georgia-Pacific Corp. idled or converted two machines at its Crossett, Ark., mill during 1984-85 with a combined capacity of 157,000 tpy. International Paper Co. this summer converted a 135,000-tpy unbleached machine at its Mobile, Ala., mill to white paper production. Champion International Corp. in July shut down a 110,000-tpy machine at its Pensacola, Fla., mill.

Grocery bag and sack paper shipments this year have shown a smaller-than-average decline. Large carryout sacks continue to withstand competition from plastic T-shirt bags, which have now captured roughly 10% of the U.S. market. Multiwall paper demand, however, has declined more sharply due to depressed demand for sacks to ship fertilizer and other agricultural supplies. Other converting and wrapping grades have shown fairly large declines, partly due to competition from plastics.

Outlook: UKP shipments are expected to decline at a roughly 5%/year average rate over the next several years, reflecting further machine shutdowns or conversions. The capacity withdrawals, however, should keep kraft paper operating rates relatively high.

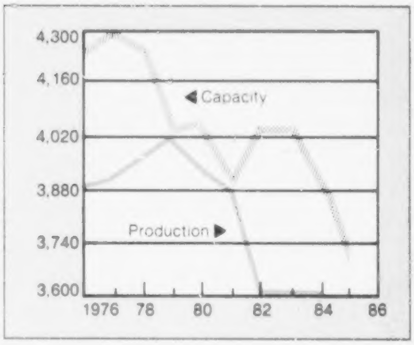
G-P plans to rebuild a 158,000-tpy swing machine at its Monticello, Miss., mill later this year. The machine at first will continue to produce some kraft paper but is expected to shift more to linerboard once market conditions improve. Champion plans to convert the 236,000-tpy air-dried (Stress Kraft) paper machine at its Pensacola, Fla., mill to white paper in 1987. This loss of capacity will be partly offset by a planned 90,000-tpy expansion of the firm's Roanoke Rapids, N.C., mill.

The American Paper Institute's last capacity survey showed 3.95 million tons of UKP capacity at the end of 1984, dropping 240,000 tons to 3.71 million by the end of 1987. Adjusted for recent withdrawal announcements, capacity may drop about 600,000 tons over this period to around 3.3 million tons by the end of 1987.

Pricing: UKP pricing has been under pressure since the fall of 1984 due to soft demand for some types of bags and sacks and the availability of low-priced spot tonnage from swing linerboard machines. Prices for 70-lb grocery sack paper reached as low as $260/ton this summer, but a recent $30/ton price increase around Sept. 1 appears to have been successful, and at least one producer has announced an additional hike for November. However, the second increase may be more difficult to achieve until linerboard prices begin to firm. A $30/ton price hike was announced on shipping sack paper for Oct. 1.

Year-end price history for 70-lb grocery sack paper is as follows: 1978, $240; 1979, $260; 1980, $280; 1981, $300; 1982, $240; 1983, $380; 1984, $330; 1985 (mid-year), $260. Multiwall sack paper (50 lb): 1978, $305; 1979, $340; 1980, $375; 1981, $405; 1982, $360; 1983, $380/$410; 1984, $390; 1985 (mid-year), $375 (with discounting).

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

	1983	1984	1985e
Shipments^1	3,666	3,666	3,280
Capacity^1	4,065	3,954	3,704^2
Utilization rate	90.2%	92.7%	88.5%
Imports	23	43	40
Exports	116	107	73
Apparent U.S. consumption	3,573	3,602	3,247
lb/capita	30.5	30.7	27.6
GNP ratio	2.33	2.20	1.92

1 American Paper Institute

2 Excludes 110,000-tpy Champion International Corp. machine shut down in mid-1985

3 Dept. of Commerce

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity	Market share (%)
1. Stone Container	645	17.4
2. Georgia-Pacific	500	13.5
3. Champion Intl.	430	11.6
4. Union Camp	415	11.2
5. Longview Fibre	320	8.6
6. International Paper	260	7.0
7. Gilman Paper	205	5.5
8. Westvaco	150	4.0
9. Chesapeake	115	3.1
10. Weyerhaeuser	110	3.0

Market share of top five companies:
62.4%

Market share of top ten companies:
85.0%

Total U.S. capacity (1985):
3,704 million short tons

KRAFT PULPING: More specialties hit the market

Cooking. Makeup kraft chemicals have traditionally been needed for balancing sodium and sulfur in the kraft recovery process and for replacing calcium losses in the causticizing cycle. Saltcake, purchased in dry form, or spent acid from chlorine dioxide generation are added to concentrated black liquor at the recovery boiler. As a result, sodium and sulfur lost out of the recovery furnace stack and washed out before, during, and after bleaching are replaced.

Some deviations from commonly used chemicals and newer and more efficient specialties are appearing more frequently in U.S. and Canadian pulp mills. Saltcake is being substituted by emulsified sulfur, caustic, and soda ash for economical and operational advantages. One of these gains is adjusting sulfidity to attain a more selective cooking liquor for higher yield and improved pulp strength. A sulfur slurry can be added to black or white liquor and converted to sodium sulfide by dissolution and evaporation. Caustic addition would be utilized for sodium, requiring less water and, subsequently, less evaporator steam and heat loss during furnace operations. Lower sulfidity could reduceevaporator scale and strengthen white liquor, among other benefits.

Soda ash could replace caustic as the sodium source, but with prices firming it is not likely to catch on quickly unless the trend toward tightening caustic supply (due to declining production of its coproduct, chlorine) becomes significant enough for a large price increase. Use of excess spent acid from chemical generation may soon have to be curtailed if government regulations continue to strive for zero effluent loads. This would push mills to purchase chlorine-dioxide-generating equipment with tighter recycling processes, which would increase the demand for supplied chemicals.

Pulp additives have been popular of late. Anthraquinone is a proven yield and strength enhancer, but high costs are depressing its use. Demand is growing for processing aids such as defoamers, slimicides, and washing aids because of their moderate price and efficiency in maintaining operational stability and pulp uniformity. Companies are supplying customized products in most cases. A number of Canadian manufacturers are using talc as a pitch dispersant aid; typical additions range from 2 to 7 lb/ton. Growth in demand for these chemicals will continue as more inferior wood is processed and mill system closure becomes common.

Recovery. Lime, limestone, and pebbled lime are all employed as a source for replacing lost calcium in the causticizing portion of kraft recovery. Fuel oil or natural gas are also used to fire the lime kiln, where heat is required to evaporate water and drive carbon dioxide off calcium carbonate to form calcium oxide. Calcium oxide—regenerated and makeup—is slaked to form calcium hydroxide, which is mixed with the dissolved smelt from the recovery furnace and eventually forms the cooking liquor. Lime demand by the pulping industry follows production patterns, and increases are mainly coming from wastewater treatment areas. Price is mostly influenced by the steel industry and has climbed incrementally to double its value of ten years ago. Larger amounts of lime will be needed if mills adjust sulfidity levels and elemental sulfur is used.

Innovative methods of improving lime kiln performance have been well received by the industry. Fluidized bed calciners, installed in a few mills, offer benefits in reduced fuel load, particulate emissions, and space and maintenance requirements, but they are more costly to purchase and operate than the common rotary kiln. Oxygen enrichment is helping mills to increase capacity in kilns—a typical mill bottleneck area. ■

TABLE 1: **U.S. demand for kraft chemicals (short tons).**

Chemical	Kraft pulping	All pulp & paper	All industry	Price
Saltcake	460,000	490,000	1,060,000	$65/ton[1]
Caustic	300,000	1,785,000	10,200,000	$175/ton[2]
Lime	575,000	1,000,000	16,100,000	$78/ton[3]
Defoamers	16,250	23,250	—	$0.80–$1.15/lb

1. Bulk purchase, 100% basis, f.o.b. works, East Coast. West Coast price add $10.
2. 50% solution, Gulf Coast works, freight equalized.
3. Quicklime, bulk f.o.b. plants.

TABLE 2: **Canadian demand for kraft chemicals (metric tons).**

Chemical	Kraft pulping	All pulp & paper	All industry	Price[1]
Saltcake	315,000	333,000	420,000	$65/ton
Caustic	246,000	990,000	1,638,500	$395/ton[2]
Lime	270,000	285,000	2,000,000	$62/ton[3]
Defoamers	10,395	15,100	—	$1.15–$1.25/lb

1. All prices are in Canadian dollars and represent list prices.
2. 50% solution, f.o.b. works, freight equalized.
3. Quicklime, f.o.b. Ontario producing points.

Europe's wastepaper demand is not too promising for U.S. exporters

European mills are expected to increase their consumption of secondary fiber but will probably not be importing much U.S. wastepaper

By DEBRA A. ADAMS, Senior News Editor

■ Wastepaper consumption in Europe is on the upswing. Its paper industry expects modest long-term growth with dramatic increases in secondary fiber use. Yet European mills probably will not have to buy any significant amount of paper stock from the outside and are not likely to go as far as the U.S. to meet any deficits.

Europe's demand for wastepaper is expected to grow at a more rapid rate between 1985 and 1990 than it did between 1980 and 1985, the Organization for Economic Cooperation & Development (OECD) reports. Yet demand for U.S. wastepaper is not likely to increase by a significant amount for at least the next five years, observers indicate.

While opportunities will open up in Europe, U.S. paper stock dealers will have better markets in such areas as the Far East and Mexico, where significant growth in wastepaper demand is expected. In addition, it is forecast that the European wastepaper sector will be able to adequately supply its own future requirements from within its borders. And what it can't get from inside will probably be obtained from countries with more favorable exchange rates than that of the U.S.

The dollar has hurt U.S. exports to Europe (and to other countries) a great deal in the past few years. But that is not the only reason behind the substantial decline in European demand for U.S. secondary fiber. Europe has also become more self-sufficient in the past few years and has alleviated shortages with imports from such countries as the U.S.S.R.

Demand from the U.S., however, remains strong from such countries as Spain, Italy, and Austria, according to David E. Stansfield, president of the Paper Stock Div. of the Bureau International de la Récupération (BIR). In 1984, U.S. paper stock exports to Spain jumped ahead of those to Italy. Spain had a 58% increase in its imports of U.S. secondary fiber to 95,178 tons, making it the seventh largest foreign consumer of U.S. wastepaper.

RECORD EUROPEAN CONSUMPTION. Last year was a record year for European wastepaper consumption, with a rise in nearly every country, including Denmark (23%), Fed. Rep. Germany (14.1%), the U.K., (9.6%), France (8.5%), Netherlands (8.0%), Italy (7.4%), and Belgium (3.0%). Overall, Europe used 10.9% more wastepaper than it had in 1983, according to the European Confederation of Pulp, Paper & Board Industries (CEPAC). U.S. paper stock exports to western Europe alone increased by more than 60% in 1984.

Wastepaper currently comprises about 45% of the fibrous materials used by the European paper and paperboard industry. Europe is a large user of recycled paper with an apparent annual consumption of 12.8 million metric tons and a recovery rate of 31%. This compares with an apparent consumption of 14 million metric tons and a recovery rate of 26% in the U.S.

TABLE 1: **Papermaking materials—Europe uses less chemical pulp than the U.S.**

Fiber	U.S. (%)	Europe (%)	Fed. Rep. Germany (%)
Pulp			
Chemical	60	45	30
Mechanical	10	15	15
Wastepaper	25	30	40
Minerals, etc.	5	10	15
Total	**100**	**100**	**100**

Source: European Paper Institute.

TABLE 2: **Demand for wastepaper from the European pulp and paper industry.**

Country	1983	1984	1985	1990
Fed. Rep. Germany	103	—	—	—
Austria	114	124	127	151
Spain	116	119	123	—
Finland	104	99	101	125
France	101	116	121	141
Portugal	126	137	151	184
Sweden	101	112	118	125
Switzerland	109	113	116	125

Source: Organization for Economic Cooperation & Development.
Index: 1980 = 100.

Europe is currently a small net importer of wastepaper, unlike the U.S., which is a significant exporter. In terms of papermaking materials, Europe uses significantly more minerals, recyclable paper, and mechanical pulp than does the U.S. It uses much less chemical pulp. A comparison of Fed. Rep. Germany and the U.S. alone shows even more pronounced differences (Table 1).

One of the reasons Europe's consumption of secondary fiber is expected to increase in the next few years is the projected rises in paper and board production and lower supplies of other raw materials (Table 2). In addition, technology has increased the industry's ability to incorporate paper stock into its papermaking systems. In fact, better technology has made it possible to downgrade the type of paper stock used. According to an OECD report, newer machines are "eliminating every kind of contaminant, lowering energy costs for processing, and improving recycled fibers."

CORRUGATED REMAINS BIG ITEM. Europe's demand for wastepaper in the future is likely to be mainly in the corrugated and pulp substitute grades, both of which are often in low supply. The greatest tonnage by far will be in corrugated.

Fred Rose, secretary to the Wastepaper and Forestry Committees of CEPAC, expects European demand for pure kraft grades from the U.S., as well as from other countries, to continue. Waste derived from corrugated containers in Europe tends to be of poorer quality than that in the U.S. because Europe's containerboard is made from a higher percentage of wastepaper—the standard being 62% wastepaper vs 38% pure kraft, said Rose.

In addition to the high-kraft recycled grades, Europe will also continue to import pulp substitutes, which are scarce in Europe, but probably at a lower rate than the kraft grades, he said (Table 3).

Observers expect Europe's future wastepaper demand will be concentrated in corrugated and pulp substitute grades.

Jorg Sudan, managing director of Bundesverband Papierrohstoffe E.V. and former president of BIR's Paper Stock Div., feels that Europe will remain a substantial consumer of corrugated, although its growing tissue industry and the need for higher-quality boxboard for more luxury retail goods are likely to put a greater demand than before on pulp substitute supplies.

Stansfield agreed that most European countries, with the exception of Scandinavia, have a deficit of pulp substitutes and the cardboard grades. "The deficit will continue," Stansfield noted at a National Assn. of Recycling Industries convention in May. "There is practically no additional potential for these grades in the printing and converting areas, and only a small potential may be available in the administration sector," he noted.

OECD reports that while demand for pulp substitutes will continue to rise, their availability in Europe will decline. Although these high grades should show the most dramatic rise in demand, the bulk of recyclable paper consumed in Europe will be in the low grades, with Italy and Spain being among the chief importing countries.

IMPROVEMENTS IN TECHNOLOGY. "We feel wastepaper demand will grow modestly with the improvement in deinking systems, resulting in more wastepaper being substituted for pulp," said a Belgian paper stock dealer. "Even now they are trying to collect more wastepaper in such areas as Scandinavia."

Yet Switzerland, Norway, and Sweden all anticipate lower growth in collections between 1985 and 1990. Austria, Canada, and the U.S. expect the opposite, according to the OECD (Table 4). This slow growth is expected to affect markets for such grades as ledgers, newspapers, and printed papers. Demand for mixed papers, meanwhile, has been increasing while the market for duplex board has declined.

Up to 1980, the European Economic Community

TABLE 3: **European pulp and paper industry demand for wastepaper by grade.**

		Grades* (%)			
Country	**Year**	**I**	**II**	**III**	**IV**
Fed. Rep. Germany	1980	14	37	11	38
	1983	15	37	12	36
Austria	1980	21	15	8	56
	1985	23	19	9	49
	1990	22	10	9	49
Spain	1980	18	57	3	22
Finland	1980	58	42	n.a.	n.a.
France	1980	11	58	8	23
Norway	1980	17	52	18	13
	1985	15	65	12	8
	1990	18	61	14	7
Sweden	1980	44	43	4	9
	1985	49	38	6	7
	1990	49	38	6	7
Switzerland	1980	53	36	6	5
	1985	54	34	7	5
	1990	54	32	9	5

*Grades: I = Old newspapers; II = Corrugated board; III = High grades; IV = Mixed wastepaper.
n.a. = Not available.
Source: Organization for Economic Cooperation & Development.

(EEC) as a whole needed to import vast amounts of wastepaper to meet its requirements. That changed in 1981. The market balanced out, even showing a surplus of paper stock. The OECD expects that with the exception of spotty fluctuations that may occur in the market, the EEC should be able to meet its future demand for paper stock without importing substantially.

Greece, Italy, Spain, and Austria are exceptions, however, notes the OECD. Italy's deficit of paper stock continues to widen and is expected to lead to a rise in wastepaper imports. Presently Italy imports 25% of its secondary fiber requirements. Spain's rate is 18%. In Austria the deficit is over 50%, but that country is expected to step up its rate of wastepaper recovery between 1985 and 1990, according to the OECD.

Although Europe is a net importer overall, some countries have become net exporters, as noted above. Recovery rates have steadily risen in many areas and have reached rates as high as 45% in the Netherlands. The northern sections have been especially adept at increasing collections, enabling them to export their surpluses, with some of it going to the southern areas. As a result, the U.S. market share in Europe has shrunk.

REGIONAL COLLECTIONS. "Wastepaper moves from North to South," said Patrick Guillanton of FCR, a large French wastepaper merchant. Collections are better in Belgium, Fed. Rep. Germany, and the Netherlands, while supplies are lowest in Italy and Spain.

Greece, Austria, Spain, Italy, and Portugal continue to be net importers of wastepaper while Belgium, Denmark, the Netherlands, U.K., and Switzerland have long been net exporters. In recent years, due to increased collections, Fed. Rep. Germany and France have also become net exporters. Fed. Rep. Germany improved its situation between 1975 and 1980. Scandinavia, on the other hand, has become a net importer as its consumption has risen in recent years while its recovery rate has not kept pace.

Exports from the U.K. were up 21.3% last year over 1983, while increases in exports were also posted in Sweden (41.9%), Fed. Rep. Germany (38.8%), France (18.2%), Belgium (16.5%), and Switzerland (15.2%). Imports rose in the U.K. (32.7%), France (27.4%), Fed. Rep. Germany (27.2%), Switzerland (27.1%), and Sweden (7.9%).

TABLE 4: **Theoretical availability and expected collection (000 metric tons).**

Country	**1980**	**1983**	**1984**	**1985**	**1990**
Theoretical availability					
Austria	350	400	420	450	625
Finland	578	637	656	676	720
Norway	420	415	425	430	460
United Kingdom	5,771	5,934	6,082	6,198	—
Sweden	1,415	1,410	1,430	1,450	1,510
Switzerland	1,110	1,050	1,100	1,100	1,200
Expected collection					
Austria	263	300	310	325	490
Finland	244	288	300	315	360
France	1,891	2,155	2,220	2,400	—
Norway	116	110	125	135	150
Sweden	576	630	645	660	695
Switzerland	550	580	590	600	650

Source: Organization for Economic Cooperation & Development.

Though advanced, Europe's wastepaper market is still plagued with problems. As in the U.S., it suffers from sudden and drastic swings, resulting in extreme supply and demand imbalances. During shortages, countries seek outside sources of paper stock until the domestic market can expand to meet the rise in demand. At other times, prices are dropped so drastically that supplies dip dangerously low and a sudden pickup usually causes havoc.

The wastepaper market in Europe since mid-1984 had become more and more "overheated," according to one industry report. This was due to collections not being able to keep up with a sharp rise in demand. A temporary shortage developed, causing a sudden rise in prices primarily for "newspapers, waste corrugated board, and mixed wastepaper." The market regained its equilibrium toward the end of the year. Prices leveled off and then started dropping early in 1985 as demand also fell, reports indicate.

In some cases, though, countries continue to import and export even when domestic supplies would otherwise be adequate, causing imbalances in the marketplace. As recently as May, the U.K. was reported to be importing well over 50% of its paper stock needs and exporting a proportionate amount. Poland was one source for imports, and trade with France was also reported. Last year was a record year in the U.K., yet this year is expected to put even more pressure on the wastepaper stream.

One paper stock dealer in Belgium indicated that there is competition among some countries, but basically the market is confined to Europe. "In Brussels we have some competition from Holland, and in south Belgium from France. But most mills stay in their own countries when looking for fiber," said a representative from N.V. Oud Papier, Oostmalle, Belgium, which collects an average of more than 17,500 short tons of wastepaper per month.

PROBLEMS WITH RISING DEMAND. Rose noted other problems with the rise in European demand. Although he projects modest growth in wastepaper consumption in Europe over the next few years, he feels the elasticity in the supply/demand situation will diminish. With a fairly high recovery rate overall in Europe currently, the paper still to be collected has a higher rate of contamination, he noted.

David A. Clark, executive director of the European Paper Institute, stated that while Europe has excelled in its wastepaper collections—reaching the high rate of 30% of paper consumption overall—further rises in that level can give problems with paper quality and collection costs.

"I think the paper industry will be forced to look for ways to modernize its potential to get more paper. It will require exploring new techniques for collection, resulting in greater involvement of the paper industry itself," said Rose, noting that changes in the supply side are likely to appear in the next several years.

Europe's wastepaper industry has some inherent problems as well, dating

(Continued on p. 107)

cooking conditions. Yet statistics indicate that this is perfectly normal within the system since this increase is only slightly more than one standard deviation from the average three-term chip moisture range. The moisture contribution to the liquor/wood ratio for these two times may be calculated from the bulk density, percent moisture, production rate, and feeder volume. The results indicate an increase in the liquor/wood ratio of 3.1 to 3.6, hardly enough to make an impact.

In all likelihood, this variation is attributable to a parameter that is difficult to quantify: chip age. During the Feb. 18 sampling period, a marked change occurred in the chip furnish appearance and in its odor. An investigation revealed that the hardwood chip storage pile was being lowered, and older chips near the bottom were being sent to the Kamyr digester. Figure 2-D shows the difference in chip appearance between 3:00 p.m. and 4:00 p.m. A detailed analysis of chip aging characteristics has recently been reported by Fuller.[2]

During the study, a long-standing contention of the operators was documented, i.e., old chips plug the digester extraction screens and produce soft cooks. The pattern that old chips display in the Kamyr's performance is similar to that displayed by large amounts of pin chips passing through the system. It is conjectured that old chips tend to fractionate more easily into pin chips as a result of the mechanical action experienced in the various feeders, screw conveyors, and separators. Most likely the older chips had been damaged by either fungal decay or compaction during storage, or both. Fungal decay may be tested by the wood's increased solubility in hot 1% sodium hydroxide solution. A review of texts on chip testing procedures did not reveal any method for determining compaction damage on chips.

CHART FOR MAR. 8, 1985. Figure 3-A shows the statistical chart plotted by the Kamyr digester operator for Mar. 8. The sample period overlaps one out-of-control point on the R chart at noon. An abnormal jump in K number occurred, from 9.4 to 12.3, as shown in Figure 3-B—a plot of hourly K numbers and the weight fractions of oversize chips. At 8:00 a.m. the amount of oversize chips was 15.9%, more than three standard deviations above the baseline average. The cook became harder because liquor and heat penetration were slower due to the increased proportion of larger chips.

This study revealed that short-term fluctuations in chip quality adversely affected K numbers for 8% of total operating time. Experience indicates this figure may actually be as much as 10% to 15%. Presently, the study has drawn attention to the desirability of maintaining uniform chip composition to the digester. A follow-up study has been initiated to find a cost-effective way to eliminate chip quality disturbances on the Kamyr. ■

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EUROPE'S WASTEPAPER DEMAND

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back through its history and slow development. It is even more complex than the U.S. market. European consumers are mostly small mills, many with special fiber needs that are harder to fill than the standard grades that comprise the bulk of demand in the U.S.

The European market is also complicated by Europe's converting processes which result in a high contamination level of recycled paper and board. Plus, recyclable paper generators are varied, causing confusion and delayed reaction after shifts in demand, said Rose.

These complexities, however, have led some observers to dispute the relationship some claim exists between pulp and secondary fiber markets. While some feel the markets closely follow each other, Rose indicated that the European wastepaper market is more closely tied to the supply/demand balance itself.

"Of the 11 million metric tons of wastepaper consumed in the EEC in 1983, 8 to 9 million tons were not influenced by the pulp market," said Rose. "Except for the grades that are considered to be pulp substitutes, there is no relationship between the price of pulp and the price of wastepaper. The price of wastepaper is related to the price of kraft liner, semichemical fluting, newsprint, and wood."

DISPUTE OVER PULP CONNECTION. The OECD, however, notes that the price of wastepaper may rise to a level comparable with that of other fibrous raw materials used in the pulp and paper industry. In certain countries, signs of a close and stable link between high-grade wastepaper and pulp prices are already evident.

In the U.S., the consensus among paper stock merchants has been that pulp and wastepaper are closely connected. Many were blaming weak pulp markets and distressed virgin fiber prices for the downturn in the wastepaper market this year. Some recycled mills shut down their deinking systems and are using pulp.

But while the domestic market began to erode early in the year, wastepaper exports to Europe didn't begin to slow down significantly until late in the second quarter. Exports dropped sharply by 25.2% from April to May, though year-to-date figures for the first five months were still 3.4% ahead of the same period in 1984.

U.S. paper stock prices declined dramatically through the first half of the year as exports decreased. The market appeared to be leveling off in July, however.

In Europe, the market began to weaken noticeably in the second quarter. The U.K. reported consumption was up 4.5% in the first quarter compared with a year earlier, but the industry was beginning to feel a slowdown late in the second quarter. A Belgian dealer said that mills were getting more choosy about their shipments—a sign of a shift in demand.

Forecasts for the wastepaper sector in Europe for the second half of 1985 were not good, with the most optimistic calling for a supply/demand balance for the remainder of the year, according to Rose.

A downturn in the European market would reduce prospects for the U.S. wastepaper industry, yet it should not have a significant effect. Many marketing executives have already established their markets in more viable areas where long-term prospects are better. Probably, the U.S. will rely less and less on European demand. ■

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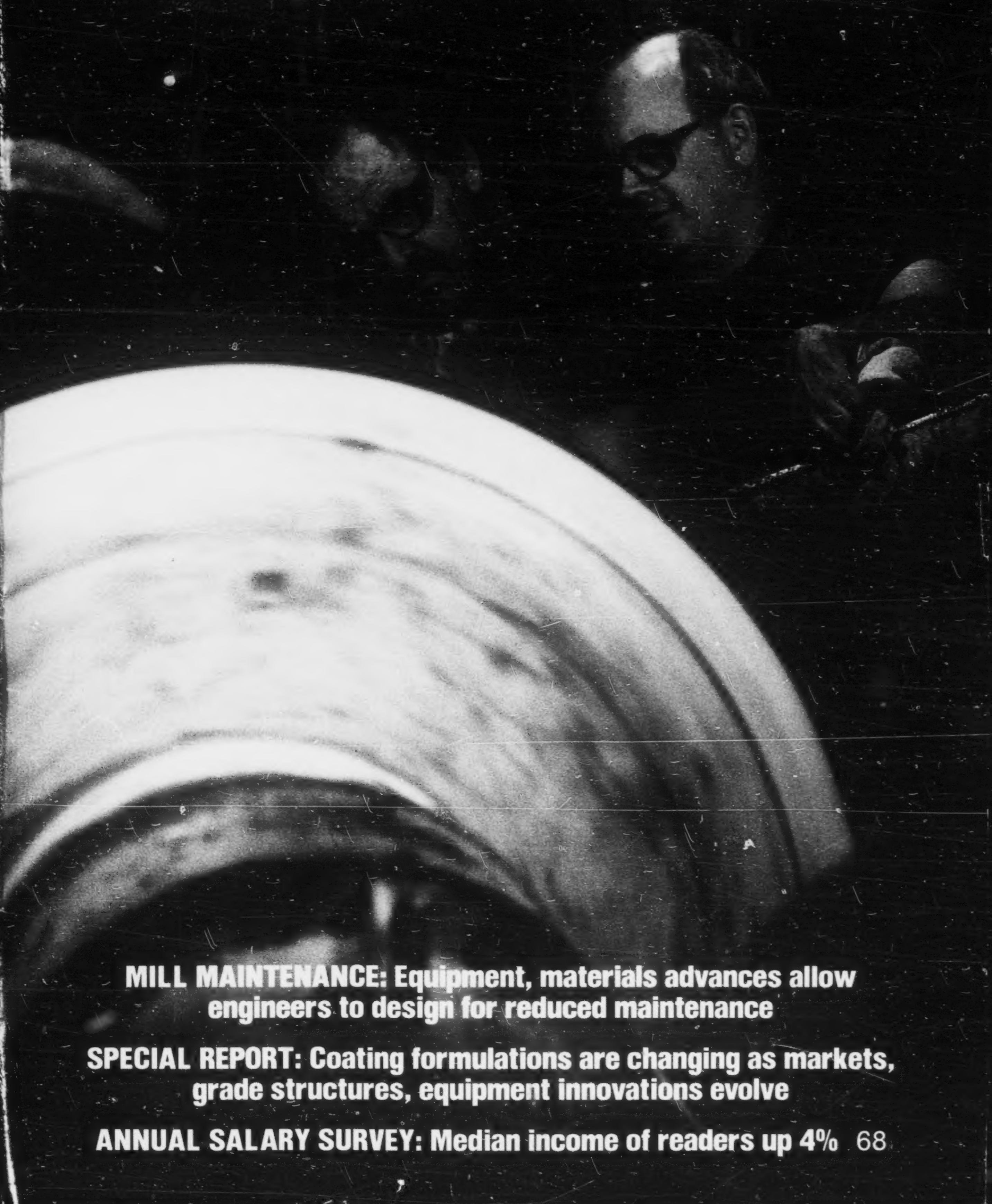
December 1985



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(Photo by Bruce Davidson, New York, N.Y., courtesy of Consolidated Papers.)

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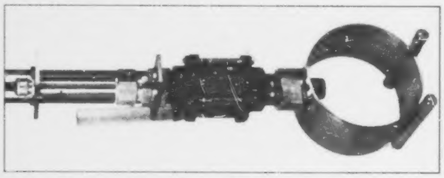

A probe-type magnetic flowmeter is nonobstructing, can be installed on virtually any size pipeline carrying a conductive liquid, is easily calibrated

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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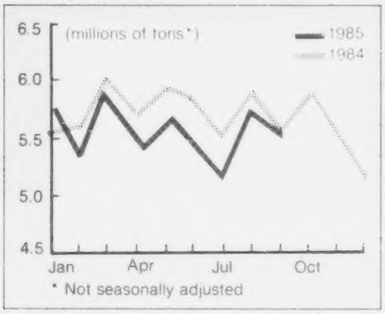
MONTH IN STATISTICS

U.S. paper and board production



U.S. paper and paperboard production in the third quarter recovered somewhat from the slow second period, but the seasonally adjusted rate of 67.2 million tpy still lagged the first-quarter rate of 67.2 million tpy, the American Paper Institute said. Moreover, weekly data show a fourth-quarter dip that, if sustained, would lead to a grand total of about 66.6 million tons for 1985—compared with 68.5 million tons in 1984.

Among major grades, printing and writing paper production was virtually even with last year, thanks to a 4.3% increase in uncoated free-sheet shipments. Newsprint and tissue also hovered close to year-ago levels, but packaging and industrial papers dropped a sharp 8.0%. Production of unbleached kraft board was off 5.8% from last year, with production for export down a dismal 23.5%, although containerboard inventories at mills and box plants are continuing to decline.

Canadian newsprint shipments dipped slightly below last September's level, while inventories held by U.S. consumers rose 3.1% and operating rates stood firm at 92%. Canadian market pulp shipments stood 4.6% above last year, but September operating rates dipped to 75%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Sept.	447	.0	5,471	−1.8
Uncoated groundwood (s)	Sept.	123	−7.5	1,469	−7.6
Coated paper (s)	Sept.	437	−14.8	5,949	−4.2
Uncoated free sheet (s)	Sept.	793	7.0	9,645	4.3
Other printing/writing	Sept.	114	−8.1	1,341	−8.7
Total packaging and other paper (s)	Sept.	468	1.3	5,240	−8.0
Tissue	Sept.	392	1.6	4,902	.8
Total paper	**Sept.**	**2,774**	**−1.1**	**34,016**	**−1.6**
Unbleached kraft paperboard	Sept.	1,407	−4.3	16,460	−5.8
Semichemical medium	Sept.	422	−3.2	5,062	−3.2
Bleached paperboard	Sept.	309	−5.8	3,975	−3.0
Recycled paperboard	Sept.	634	2.1	7,668	−1.2
Total paperboard	**Sept.**	**2,772**	**−2.9**	**33,184**	**−4.0**
Total U.S. paper and paperboard output	**Sept.**	**5,545**	**−2.0**	**67,201**	**−2.8**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Aug.	4,518	−5.7	54,284	−3.1
Market pulp production	Aug.	541	−8.8	6,872	−.1
Wastepaper consumption at paper/board mills	Aug.	1,294	−4.1	15,197	−4.4
Pulpwood consumption (cords)	Aug.	6,925	−6.0	85,733	−2.7
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	Sept.	22,037	1.2	200,642[6]	−.5
Containerboard inventories at U.S. box plants and mills	Sept. 1	2,694	−4.5		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Aug.	873	−7.1	10,999	3.8
Imports of Canadian newsprint	Aug.	639	−8.2	8,067[6]	4.9
U.S. paper exports (including products)	Aug.	356	1.7	4,001	−10.0
Exports of unbleached kraft linerboard	Sept.	145	−18.1	1,729	−23.5
Exports of woodpulp	Aug.	303	−4.7	3,852	5.2
Norscan pulp inventories[4]	Sept. 30	1,397	−10.0		
Norscan pulp operating rates[4]	Sept.	80%	87%	87%	86%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Sept.	696	−6.3	6,652[6]	−.7
Operating rates	Sept.	92%	92%	92%	91%
Inventories held by U.S. consumers	Sept. 30	1,526	3.1		
Other paper/board shipments	Sept.	245	18.4	2,237	9.5
Woodpulp shipments (export only)	Sept.	571	−4.7	5,192[6]	4.6
Operating rates	Sept.	75%	83%	87%	85%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = shipments.

NEWSPRINT: Little growth in U.S. markets seen for 1986, prices will remain weak

Grade structure: About three-quarters of all newsprint consumed in the U.S. is used by daily newspapers, with the balance going largely to government printers, weekly newspapers, and commercial printers for end uses such as newspaper inserts, flyers, and comic books. Standard newsprint basis weight is 30 lb/3,000 ft², with a range from 28 lb to 32 lb being most common in the U.S. There has been some shift to the lightweight end of the range in New England and in one or two southern mills. Brightness of newsprint is typically in the 55 to 61 range compared with the 60 to 70 brightness range for uncoated groundwood grades.

Production/capacity: North American mills produced very close to record amounts in 1985, but an influx of low-priced imports from overseas absorbed any growth in the market. Output is expected to show little improvement in 1986, while operating rates will also be largely unchanged due to the absence of any significant new capacity.

Canadian mills supplied 57% of U.S. consumption through the first three quarters of 1985, up from the 56% they supplied in the same period of 1984 when a two-month shutdown in British Columbia reduced Canada's market share. Market share in the U.S. of overseas mills rose to 2.6% from 1.7%. Canada's shipments to its own market fell 2.4% through September, and its sales overseas dropped by 5.4%.

Outlook: With the U.S. gross national product expected to rise by about 2.75% in 1986, and newsprint demand being held back by a likely consumer inventory reduction and continued caution on the part of advertisers, the U.S. market should be in for a repeat of 1985.

Consumption is projected to rise by 1.5%, and offshore imports will retain their market share, although their growth has probably peaked out. Indeed, there are signs that importers to the eastern region are beginning to shift their marketing from spot market deals to long-term contracts.

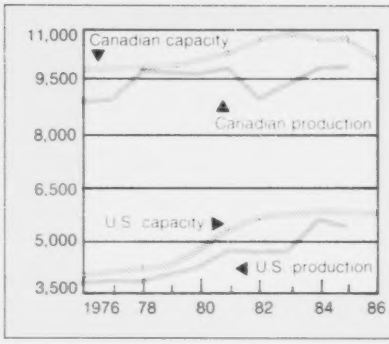
But the combination of slow demand growth and continued import penetration means occasional downtime for domestic mills and trouble in getting through a price increase before October—if then.

Pricing: One producer announced a $32/short ton price increase (to $517) for Jan. 1, 1985, which was rolled back to Apr. 1 due to lack of industry support. Including Jan. 1, various mills tried to raise prices seven times in 1985—all unsuccessfully. It was thought possible that another attempt might be made for Apr. 1, 1986, which would have to be announced by Jan. 1, 1986. In the meantime, discounting was so widespread that the average market price was believed to be no higher than $445/short ton going into the fourth quarter. West Coast firms formalized this price weakness by offering contract customers who take 10,000 tpy a 5% discount on top of previous discounts, bringing their price to $438.

List price history is as follows: (U.S. East, contract, year-end) 1974, $235; 1975, $258; 1976, $285; 1977, $300; 1978, $320; 1979, $375; 1980, $400/$426; 1981, $454; 1982, $425; 1983, $454; 1984, $485; 1985, $485.

Markets: Canada's market share in the U.S. was 56.9% in 1984, down slightly from the 57.4% of 1983. Canada has supplied about 57% of U.S. demand for several years. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1984	1985e	1986e
United States			
Production[1]	5,539	5,419	5,504
Capacity[1]	5,847	5,758	5,765
Utilization rate	94.7%	94.1%	95.5%
Apparent U.S. consumption	12,611	12,733	12,924
lb/capita	107.1	107.1	107.7
GNP ratio	7.70	7.55	7.46
Canada			
Production[2]	9,937	9,965	10,072
Capacity[2]	10,825	10,825	10,979
Utilization rate	91.8%	92.0%	91.7%

1. American Paper Institute data
2. Canadian Pulp & Paper Assn. data

e = *Pulp & Paper* estimate

TOP PRODUCERS (000 tpy)

	Annual capacity			Market share (%)
	U.S.	Canada	Total	
1. Abitibi-Price	334	1,755	2,089	12.6
2. Bowater[1]	975	225	1,200	7.2
3. CIP Inc.	—	1,189	1,189	7.2
4. MacBlo	—	872	872	5.3
5. Champion[2]	802	—	802	4.8
6. Kruger[3]	—	802	802	4.8
7. Boise[4]	524	273	797	4.8
8. Ontario Paper	—	768	768	4.6
9. Con-Bath	—	724	724	4.4
10. K-C[5]	328	364	692	4.2

Market share of top five companies:
37.0%

Market share of top ten companies:
59.9%

Total North American capacity (1985):
16.583 million tons

1. Includes Catawba Newsprint (51% owned), Calhoun, Tenn., and Bowater Mersey (51% owned).
2. Consists of newsprint mills of the former St. Regis Paper Co.
3. Includes the Corner Brook, Nfld., mill acquired from Bowater.
4. Includes Boise Southern, DeRidder, La.
5. Includes Spruce Falls Power & Paper (50.5% owned).

and 7 paper machines. In February, No. 6 was fitted with a Jagenberg Inc. rod clay-coater to improve the quality of the Aqua-Kote SUS beverage carrier board it produces. Improvements to No. 7 were completed in May but only announced recently (*P&P*, Nov., p. 31).

The current rebuild will increase No. 6's annual capacity to 350,000 tons and enable it to produce preprint linerboard and folding carton grades as well as carrier board. Capacity of coated SUS for the beverage industry, folding cartons, and preprinted linerboard—which are made on the mill's Nos. 2, 6, and 7 machines, respectively—will be raised to 647,500 tpy when the project is completed, the company said. Manville's president, Harry Sherman, said, "Our goal is to be the quality leader and low-cost producer in the coated paperboard field."

- Separately, Manville announced the indefinite shutdown of No. 1 machine at its West Monroe, La., mill due to depressed market conditions. The machine, which only resumed production in the middle of last year after a two-year shutdown, has capacity to produce about 300 tpd of semichemical medium. ■

South Korean company studies NSAQ process

Dong Bang Chemical Co. of Seoul, Rep. Korea, has announced its intent to study the feasibility of starting up a neutral sulfite anthraquinone (NSAQ) pulp mill at the site of a shutdown newsprint mill in Ocean Falls, B.C. According to a spokesman for the British Columbia Ministry of Industry & Small Business, the project is only in the conceptualization stage.

The preliminary proposal calls for Dong Bang and an as yet unnamed partner in British Columbia to produce 82,500 a.d. metric tpy of NSAQ market pulp, all to be exported to Rep. Korea. The Koreans and their consultant, Arbokem Inc. of Montreal, Que., estimate that it would cost about $40 million to restart the Ocean Falls mill, which has been shutdown for five years and is now owned by the provincial government of British Columbia. ■

SALES/EARNINGS

Third-quarter profits plunge 43.7%

Poor pricing coupled with lower volume caused the U.S. paper industry to plunge 43.7% in the third quarter on a 0.5% increase in sales from the same period a year earlier, according to a *P&P* survey of results from 33 companies. Most companies blamed the unfavorable industry operating conditions on the strong dollar, sluggish U.S. industrial activity, and overexpansion in some key grades.

Packaging grades, paperboard, and market pulp continued to show little better than a break-even performance at best, while uncoated white paper profits remained under pressure from competitive pricing. Some weakening in demand was also noted for newsprint and coated publication paper grades. The best performers were tissue producers and some specialty paper producers, who were probably less affected by the dollar and helped by lower fiber costs. Some companies

U.S. paper industry third-quarter results.

	Third quarter ($000)			
Companies	**Sales**	**Change 1985/84**	**Earnings[1]**	**Change 1985/84**
Boise Cascade	$934,230	−3.0%	$20,330[2]	−37.9%
Bowater Inc.	218,975	5.4	16,504	−9.3
Champion International	1,330,435	17.6	37,940	−5.7
Chesapeake Corp.	161,911[3]	39.8	3,422[3]	−57.0
Consolidated Papers	171,898	3.2	23,911	42.8
Crown Zellerbach	788,200	−2.6	(84,600)[4]	n.m.
Federal Paper Board	179,716	14.5	2,044	−85.2
Fort Howard Paper	362,882	3.2	44,166	17.9
Georgia-Pacific	1,752,000	−0.4	58,000[5]	−28.4
P. H. Glatfelter	64,904	−7.3	8,282	−74.7[6]
Great Northern Nekoosa	475,300	0.7	9,600	−68.5
Hammermill Paper	416,950	−0.2	5,631	−25.7
International Paper	1,100,000	−8.3	15,200[7]	−78.8
James River (7/28)	629,862	0.7	23,727[8]	6.0
Jefferson Smurfit	155,625	−7.9	3,838	−43.2
Kimberly-Clark	1,015,400	12.2	62,300	18.2
Longview Fibre (7/31)	110,445	−13.3	3,795	−52.2
Louisiana-Pacific	332,400	6.3	11,400	62.9
Mead Corp.	709,500	0.2	23,600	−51.0
Mosinee Paper	47,875	−1.2	2,564	24.3
Pentair Inc.	129,087	−9.0	4,589	−9.4
Pope & Talbot	81,952	−0.6	2,017	n.m.
Potlatch Corp.	239,643	−3.8	11,270	0.9
Scott Paper	765,600	9.5	56,300	12.6
Southwest Forest Products	181,599	−10.6	(2,842)	n.m.
Stone Container	304,342	−4.4	(5,979)	n.m.
Temple-Inland	311,000	−4.0	17,500	−36.1
Union Camp	463,771	−6.8	20,150	−59.2
Wausau Paper Mills (8/31)	52,897	7.7	2,838	83.8
Westvaco	419,115	−6.0	23,166	−43.3
Weyerhaeuser	1,291,761	−33.8	38,607	−33.8
Willamette Industries	287,210	−2.8	14,760	−27.8
Total	**15,487,435**	**0.5**	**474,030**	**−43.7**

1. Income after taxes from continuing operations, excluding most significant items in both years.
2. Includes pretax gain of $6.7 million from sale of building materials distribution unit, offset by $6-million charge related to employee separation.
3. Includes results of Wisconsin Tissue Mills and Plainwell Paper acquired July 1, 1985.
4. Loss includes aftertax charge of $106.2 million from restructuring.
5. Latest quarter is before loss of $30 million from disposal of discontinued oil and gas unit; year-earlier quarter includes $19-million pretax gain from sale of office building.
6. Year-earlier period includes $24.6 million gain from sale of West Carrollton, Ohio, mill in September 1984.
7. Latest quarter includes pretax charge of $290 million for early retirement and staff cuts.
8. Adoption of LIFO accounting increased 1985 quarter income by $4.2 million.

n.m. = Not meaningful.

also reported higher profits from restructured wood products operations, despite depressed lumber prices and competition from Canadian imports.

A number of companies also took major charges in the third quarter related to organizational restructuring, asset sales, and personnel cutbacks. Most chief executives were not very optimistic about the remainder of 1985, although some expressed hopes for better industry conditions next year. "Given the expected levels of overall economic growth and the relative strength of the dollar, it is unlikely that we will see any substantial improvement in market conditions until next year," observed Peter J. McLaughlin, chairman and CEO of Union Camp Corp.

Dollar—the villain. The biggest villain in the dismal third-quarter performance was the strong U.S. dollar. "The strength of the U.S. dollar has been a major factor in depressing prices for Great Northern Nekoosa, our industry, and much of American manufacturing," observed William R. Laidig, chairman of GNN. "The problems caused by the strong dollar have been intensified by the startup of new industry capacity, including our own, at a time when the expansion rate of the economy has slowed." GNN reported a 68.5% decrease in profits on a 0.7% increase in sales for the third quarter compared with a year earlier.

Union Camp Corp. reported a 59% decline in earnings on a 6.8% drop in sales for the third quarter compared with a year earlier. "Although the U.S. dollar recently weakened slightly, it was not sufficient to generate meaningful improvement in export markets, particularly for linerboard," McLaughlin noted. Demand for uncoated white paper remained satisfactory, with increased shipments reflecting additional capacity from the new Eastover, S.C., mill. "However, pressure from imports and increased industry capacity have held prices below the levels of last year," he said.

Mead Corp. showed a 51% decline in profits on flat sales for the third quarter. "The strong dollar has made U.S. producers uncompetitive in export markets," commented Burnell R. Roberts, chairman and CEO. "Mead's paperboard prices deteriorated as export tonnage has moved back onshore. Pulp prices have continued to bump along the bottom," Roberts noted, "although we are beginning to see some positive impact from the weakening of the dollar. It will take another 20% to 25% decline in the value of the dollar before we are competitive in world markets," he said. Demand for coated paper was down as customers liquidated inventories, and a poorer combination of products reduced profitability.

Charges for restructuring. International Paper Co. showed a 78.8% drop in third-quarter earnings to $15.2 million, although the latest period included a pretax charge of $29 million for pension expense related to the company's early retirement program. "We are encouraged by the results of our cost reduction activities and improved manufacturing performance. However, our earnings continue to be affected by the weak pricing and demand environment in our industry," stated IP's chairman and CEO, John A. Georges. As part of this cost reduction effort, the company has trimmed its salaried work force by 1,000 people.

Crown Zellerbach Corp. reported a slight decline in operating earnings for the third quarter, although a substantial charge related to the company's restructuring program resulted in a net loss. The aftertax charge of $106.2 million resulted in a net loss for the third quarter of about $84.6 million.

A 36.1% decline in profits from a year earlier was reported by Temple-Inland Inc., which it attributed mainly to price weakness in corrugated boxes and bleached board. Chesapeake Corp. reported a 57% decline in third-quarter earnings, while net income at Federal Paper Board Corp. was down 85.2%.

Tissue is bright spot. Tissue producers were some of the strongest third-quarter performers. Kimberly-Clark Corp. rolled up an 18.2% increase in third-quarter earnings and said that the major factor in the increase was higher sales of its Huggies diaper line in North America. Scott Paper Co. reported a 12.6% increase in profits for the period. Fort Howard Paper Co. posted a 17.9% increase in third-quarter earnings mainly due to higher unit volume and prices on tissue products. ■

LABOR

PPIRB chairman calls for cooperation to end strife

The Pulp & Paper Industrial Relations Bureau's (PPIRB) chairman and CEO, Don Saunders, told the Conference Board of Canada at a meeting in Ottowa this fall that more cooperation is needed in labor negotiations as a result of the depression in British Columbia's forest products industry.

Pointing out that the British Columbian industry is in "considerable trouble because we are not making any money," Saunders said that the biggest challenge facing labor and management is to "jointly find ways to regain company profitability without lowering the standard of living of company employees."

Twelve management and labor representatives of the British Columbian industry formed a committee in May and have met intermittently since then to try to work out a new bargaining structure in time for the start of labor negotiations next spring. Contracts expire next June 30 and July 15. ■

PPIRB chairman Don Saunders urged labor and management to cooperate in solving problems in British Columbia's forest products industry.

Unions settle at Skowhegan; strike notice at Counce

Workers in the three striking unions at the Skowhegan 600-tpd lightweight coated paper mill of **Scott Paper Co.**'s S.D. Warren Co. division in Hinckley, Maine, reached agreement with the

The year that was

1985 will go down in the economic record books as the year in which much was promised and little delivered—particularly in the paper industry. In the collective bargaining arena, new labor agreements were negotiated in the airline, trucking, and rubber industries. At G.E., Westinghouse, and American Motors, the tone of prior negotiations continued. Chrysler's profits produced the expected "catchup" pressures.

The rubber workers' union (URW) negotiated a settlement, with the Big Four tire makers calling for a $0.43/hour wage increase over the three years of the contract. The Teamsters also reached an agreement for a three-year term, with an increase of $1.50/hour, covering 200,000 employees. General Electric and Westinghouse both negotiated similar three-year settlements, calling for lump sum payments in the first year and increases of 3% in each of the next two years.

Airline industry negotiations were concessionary in nature as deregulation continues to affect the industry's labor relations. As the role of the nonunion airlines increases, companies with unionized work forces seek ways to compete with them. American Motors, negotiating with two UAW locals in Wisconsin after threatening to close the plants, reached an agreement when the union made wage and time off concessions in exchange for job security guarantees.

PAPER INDUSTRY. Increasingly, bargaining results in the paper industry reflect these concessionary trends. Through August 1985, the paper industry was settling its labor agreements with wage increases at almost a full percent less than it had in 1984. This doesn't fully take into account the fact that over 50% of the agreements bargained in 1985 included cash settlements, which averaged almost 4%. Cash was often given in exchange for productivity improvements, which were (and are) essential for companies to become cost competitive in what has become a worldwide market.

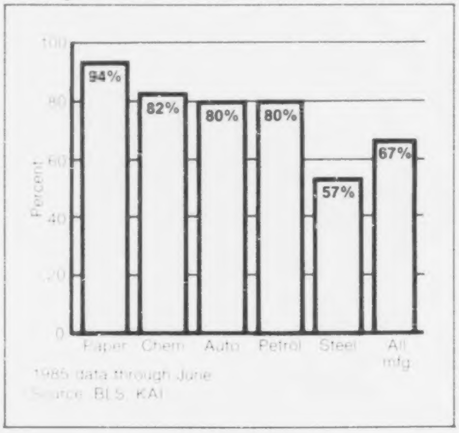
The paper industry was for many years fourth or fifth in the manufacturing labor cost hit parade. The steel, auto, chemical, and petroleum industries all had employment costs well above those of the paper industry. In the late 1970s, the paper industry began a dramatic shift upward. In 1975, the chemical industry was, on the average, paying $0.20/hour more than the paper industry. By 1985, these roles had been significantly reversed. In fact, in the last eight years, paper has had the largest increase in average hourly earnings of all those industries mentioned (Figure 1). From 1960 to 1985, paper industry average hourly earnings have increased three times as rapidly as those of U.S. manufacturing as a whole. In a year in which 42% of workers received a wage freeze or decrease, paper industry workers did reasonably well. One effect of the current environment has been the elimination of regional patterns.

As companies seek to be competitive in a world marketplace, cost reductions in labor, as well as in energy, raw materials, etc., is essential. Companies are therefore looking at profit margins rather than regional patterns. In this year alone, we have seen a decline of almost 20% in linerboard exports and an increase in coated paper imports of up to 80%—almost 9% of the U.S. market.

Another important element in paper industry labor costs are the significantly higher level of employee benefits and "pay for time not worked" than any of the continuous process industries we've looked at. I'm sure these will be addressed in 1986.

1986 BARGAINING. While concessions should dwindle by the end of 1986, they won't disappear. The steel industry is still in a survival mode, and its revised bargaining arrangement should produce variations in individual company settlements. The petroleum, glass, aluminum, and farm equipment industries and Bell System negotiations fill out the 1986 calendar. All in all, it should be a heavy bargaining year with different results in this new era of bargaining.

FIGURE 1: **Percent change in average hourly earnings for selected industries, 1977-1985.**



1985 data through June
Source: BLS, KAI

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PAPERMAKING: Customized products increasing in popularity

Consumption. Developments in paper furnish additives have helped manufacturers improve forming and retention over the last decade. Today, the trend appears to be toward operational aids, such as chemicals for in-house water treatment and equipment life extenders. Suppliers are seeking to customize papermaking additives since many produce a number of specialties. Meanwhile, commodity chemicals have been threatened by the emerging acceptance of alkaline papermaking. Chemical modification could grow significantly among all paper manufacturers if this trend continues.

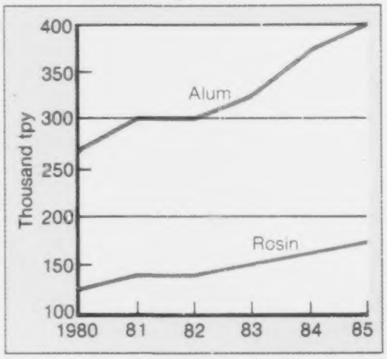
Most papermaking chemistry is centered around the addition of rosin size, alum, dry- and wet-strength resins, and starch, and a combination of inorganic filler materials. Typical alum/rosin systems employ a 3:2 ratio, depending on the pH, other additives, paper strength requirements, and loading. Alum consumption in U.S. papermaking operations is estimated at 400,000 tpy, with an almost equal amount used in effluent treatment. Consumption of rosin is difficult to determine since many paper companies use the byproduct of in-house kraft pulping, but it is assumed to be in the range of 250,000 tpy. Dry-strength resins, such as anionic acrylamide, improve burst and fold properties. Addition varies between 2 and 12 lb/ton, depending on the chemistry and desired paper properties. Melamine and other wet-strength resins are applied in small amounts on most grades (under 3% based on dry weight of fiber) and in larger amounts for wet-strength papers. (For starch consumption, see starch survey, p. 83 of this issue.)

Among popular specialties are biocides, water-based antifoams, felt conditioners, and retention and drainage aids. Consumption of these chemicals is hard to identify since many suppliers sell not only the product but the technical service as well (which can alter consumption frequently). Since each paper machine has its own recycle rates, freshwater hardness, fiber composition, and many other individual specifications, suppliers attack operational problems such as pitch deposit and fungus buildup with a blend of chemicals.

A rough estimate of consumption for dry retention aids is less than 10,000 tpy, while applied biocides are nearly the same. Dispersants and surfactants are usually applied together, so consumption figures do not really mean much. A few mills use chlorine dioxide to clean out machine equipment. This may become more prevalent if the new capacity (mostly in Canada) for producing sodium chlorate (the chief reactant) drives its price down. All specialties are expected to grow significantly during the next 15 years, as suppliers and paper chemists seek out new ways to extend fiber, run cleaner operations, and obtain better overall retention and formation in papermaking.

No papermaking report would be complete without a word about alkaline papermaking. This technological advance has been slow to gain acceptance in U.S. operations, with an estimated 10% of all paper produced now using its technology. If that were to grow to 50% by the end of this decade, major consumption reductions in filling kaolin and alum would result. Chemical consumption would probably increase, especially in the specialties area. Synthetic sizing agents, including the now popular ASA and AKD, would grow in use tremendously, eliminating rosin addition. These chemicals represent a $24-million market today, which should double in the next five years.

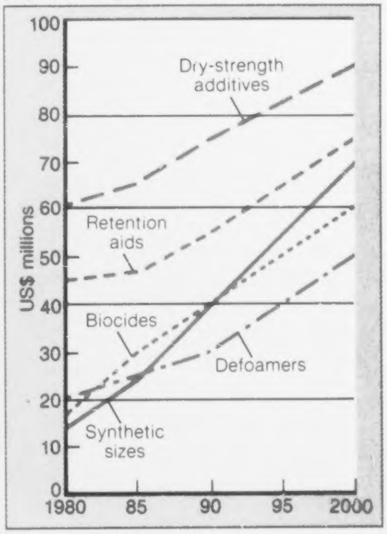
FIGURE 1: **Consumption of alum and rosin in U.S. papermaking.**



Prices. For the specialty chemicals, most range from just under a dollar to two dollars per pound (based on dry weight of the product). These prices tend to rise incrementally as the market will bear, and many price increases are attributed to service costs. Severe problems (such as microorganism buildup) may multiply the cost of blends by as much as a factor of two. Figure 1 estimates the dollar volume growth for specialties, taking into account moderate growth for alkaline papermaking.

For the commodities, pricing is somewhat easier to determine. Rosin, though much of it comes from in-house sources, is expected to remain at the $35/ton level for a 70% pale paste grade, while a slightly lower price is typical for the less used dispersed grade. Alum producers may increase prices if processing and raw material costs continue to rise. List prices for papermakers' alum averages around $140/ton, with discounting and freight variations. Supply of all these chemicals exceeds demand, so market conditions should not play a role in price fluctuations for the next several years. ■

FIGURE 2: **Present and future value of papermaking specialties.**



THIRD SALARY SURVEY

Readers reported a median income of $46,000 this year; administrators, scientists, and consultants were top earners

Median income up 4% from last year

By KENNETH E. SMITH, Executive Editor

■ This is *Pulp & Paper*'s third annual reader salary and opinion survey. The August 1985 issue (p. 76) contained a postage-paid questionnaire that readers were asked to complete and mail back to us by Oct. 18. A total of 1,689 responses were received by the deadline and were turned over to an independent firm for data processing.

This year the median income of all respondents was $46,000—a 4% increase over last year's figure of $44,000. The median income of all respondents in 1983 was $41,000. Benefits received averaged between $5,000 and $10,000, as they did the two previous years. The *P&P* survey figures compare favorably with those reported for engineers in the pulp and paper industry in a survey by the Engineering Manpower Commission of the American Assn. of Engineering Societies (*P&P*, March 1985, p. 118). That survey showed a median salary for paper industry engineers of $40,000 in 1984, up 3.5% from 1983.

The profile of the average respondent has changed very little since the first survey. The average respondent this year is male (99%), lives in the Southeast (34%) or the Midwest (24%), works for a large wood products/pulp/paper manufacturer (78%) in mill operations (17%), engineering design (14%), or technical service/quality control (13%), and obtained his highest degree in mechanical engineering (17%), business (17%), paper science and technology (16%), or chemical engineering (16%).

The average respondent seems happy in his job and very stable. He has been with his present employer ten years. Only 14% of the respondents changed jobs in the past three years. Most respondents seem satisfied, as 90% reported they like their jobs. The majority (85%) say they would stay in the paper industry if they changed jobs. Not surprisingly, most (90%) felt their companies listen to and value their opinions.

Some other interesting statistics follow:

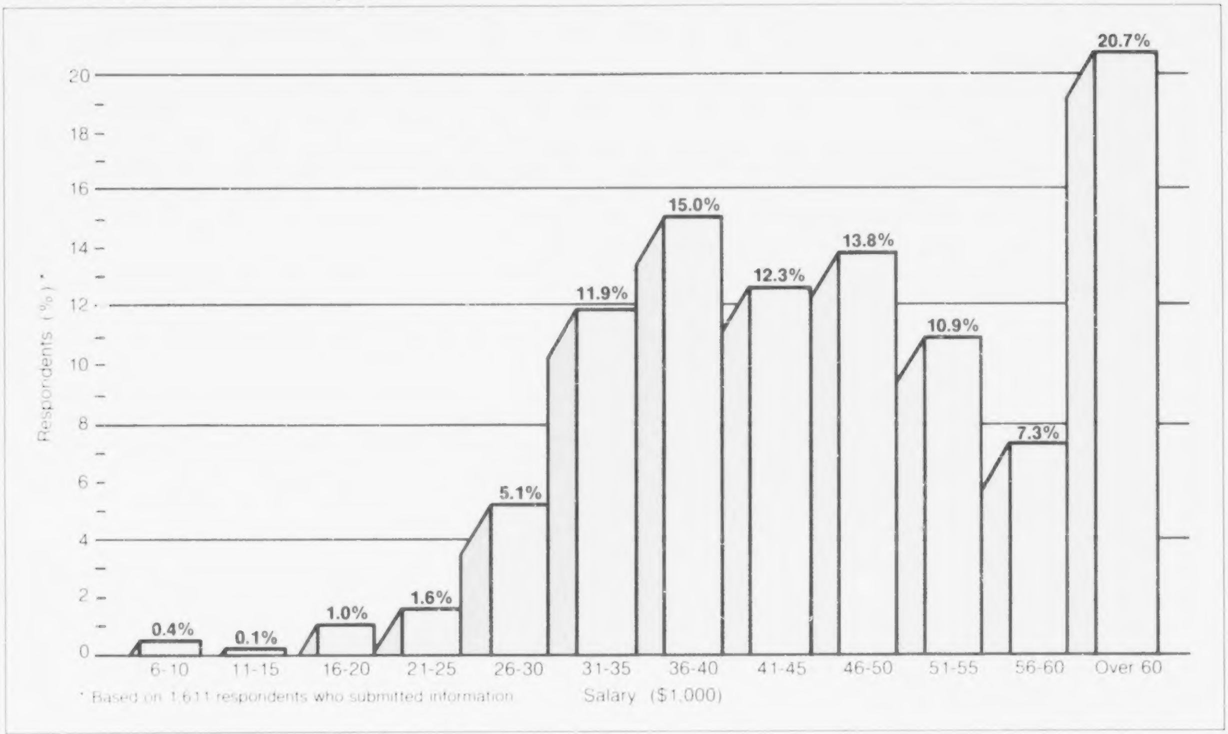
Compensation—

- Respondents receive an average of ten paid holidays and three weeks of vacation per year
- Salaries were increased an average of twice in the past three years
- The last pay increase received averaged 7%
- 88% of all respondents are not paid overtime
- 94% receive annual salary reviews based on performance/merit (55%), cost of living (4%), or both (30%).
- The average respondent has not had a promotion in the past three years.

Personal—

- 99% of all respondents work full time; only 1% are self-employed
- Only 15% of all respondents are suppliers or consultants to the industry
- 65% of all respondents working for wood products/pulp and paper producers work at mill sites
- 64% of the respondents have at least team or unit management responsibility
- 45 hours is the average work week
- 64% have been in the paper industry for their entire careers
- 32% are between 31 and 40 years old; 28% are between 41 and 50
- 62% have at least bachelor's degrees; 22% have advanced degrees
- The average respondent has had 10 to 14 years' work experience since leaving school
- 62% have had no more than two employers during their careers
- 64% belong to a technical or professional society; only 39% have received management training in the last two years
- 59% rated their morale "above average."

FIGURE 1: **Income distribution of respondents.**



* Based on 1,611 respondents who submitted information

SURVEY RESULTS. As in previous years, survey results are presented here in a series of tables (Tables 1 through 16) comparing compensation with a number of variables, including degree, discipline, work type and experience, size and type of employing organization, and supervisory experience.

This year only 2% of all respondents were Canadian. Because of this small response, meaningful data for Canadian respondents could not be obtained. However, the median income for Canadian respondents is $40,000. Median income for Canadian respondents in 1984 and 1983 was $37,000 and $38,000, respectively. Respondents were asked to convert their incomes to U.S. dollars, and these figures may reflect changes in the strength of the dollar more than they do changes in respondents' earnings.

Data given in the tables are for all respondents, including the Canadians and others outside North America (0.5% of all respondents). Income figures reported in all tables were obtained by adding any bonuses or additional income reported by respondents to their reported gross salaries. Survey respondents were asked to estimate the value of all benefits received by them as part of their compensation packages.

Table 2 shows a breakdown of benefit values reported by respondents over certain ranges. However, the value of certain benefits, such as company cars, life and medical insurance, and retirement plans is often hard to estimate, and the data in Table 2 is probably not reliable. Therefore, Table 3, which lists tangible benefits usually received as part of compensation packages compared with the percentage of respondents who normally receive them, is more useful for comparison purposes. Table 3 shows that company-paid medical, life, and dental insurance along with some type of retirement pension plan are received by at least 80% of all survey respondents.

TABLE 1: **Salary distribution of all respondents.**

	Salary ($000)		**Change**
	1985	**1984**	**(%)**
Lower decile	31	30	3
Lower quartile	37	36	2
Median	46	44	4
Upper quartile	58	55	5
Upper decile	74	70	5

TABLE 2: **Employee benefits, all respondents.**

Benefits value ($000)	**Respondents (%)**	
	1985	**1984**
0 to 1	0.4	0.4
1 to 2	3.6	3.2
2 to 3	5.3	4.7
3 to 4	6.2	7.0
4 to 5	5.9	4.9
5 to 10	28.5	31.2
10 to 15	23.7	25.1
15 to 20	12.7	10.9
20 to 50	13.0	12.0
>50	0.8	0.7

TABLE 3: **Benefits of all respondents.**

Benefit	**Respondents (%)**	
	1985	**1984**
Medical insurance	94.7	92.7
Life insurance	91.1	91.3
Profit sharing	30.2	57.9
Retirement pension plan	86.1	86.1
Company car	13.6	41.1
Bonus plan	25.6	36.9
Stock option plan	43.3	34.9
Dental insurance	79.8	47.0
Travel budget	27.0	16.5
Education allowance	51.3	27.0

EVALUATING THE RESULTS. Respondents reported that their last salary increases averaged 7%. They also reported that they had received an average of only two salary increases in the past three years, while at the same time indicating that their salaries are normally reviewed on an annual basis. This data is similar to that reported in the two previous surveys and seems to indicate that salary freezes have been in effect for many re-

TABLE 4: **Income and type of employment organization, all respondents.**

Employing organization	Income ($000) Lower decile	Lower quartile	Median	Upper quartile	Upper decile	Change in median '84/'85 (%)	Respondents
Academic	41	41	49	49	56	8	3
Government	19	19	36	40	40	16	4
Wood/pulp/paper—engineering	30	37	45	57	72	0	193
Wood/pulp/paper—manufacturing	31	37	46	56	73	4	1,053
Consulting firm	37	46	51	63	80	0	102
Self-employed consultant	34	40	75	80	80	25	6
Wood/pulp/paper—supplier	35	42	50	60	69	11	127
Wood/pulp/paper—converter	34	35	43	70	95	2	37
Other	22	34	45	60	80	0	67

TABLE 5: **Income and principal work function, all respondents.**

Principal function	Income ($000) Lower decile	Lower quartile	Median	Upper quartile	Upper decile	Change in median '84/'85 (%)	Respondents
Administration	31	41	55	78	115	−5	183
R & D	30	38	46	56	75	2	171
Consulting	36	44	51	60	78	1	65
Engineering design	33	37	45	55	65	4	221
Teaching/academic	39	39	41	41	56	5	3
Product development	30	37	44	62	71	15	32
Production and mill plant oper.	33	39	49	56	73	8	273
Engineering/maintenance	33	36	42	52	63	4	167
Sales and marketing	35	42	52	61	79	6	155
Technical service quality control	28	33	40	50	61	2	204
Other	30	35	45	56	72	12	130

TABLE 6: **Income and size of employing organization, all respondents.**

Organization's annual sales ($ million)	Income ($000) Lower decile	Lower quartile	Median	Upper quartile	Upper decile	Change in median '84/'85 (%)	Respondents
<100	31	39	48	60	80	9	250
100 to 499	31	36	46	55	67	0	246
500 to 999	31	38	48	60	80	6	184
1,000 to 2,000	32	38	47	58	78	2	282
>2,000	32	38	46	59	74	4	488
Do not know	27	33	41	50	60	7	108

TABLE 7: **Income and level of supervisory responsibility, all respondents.**

Supervisory responsibility	Income ($000) Lower decile	Lower quartile	Median	Upper quartile	Upper decile	Change in median '84/'85 (%)	Respondents
None	27	33	38	47	54	−5	218
Indirect or staff	31	35	42	51	63	7	356
Team or unit	32	37	44	52	60	4	254
Project or section	33	38	46	55	65	2	300
Major department or division management	37	46	56	70	87	3	379
Corporate management of organization	38	53	73	109	150	4	91

TABLE 8: **Income and professional experience, U.S. respondents.**

Years since school	Median income ($000)
0 to 4	33
5 to 9	39
10 to 14	45
15 to 19	49
20 to 24	52
25 to 29	56
30 to 34	55
35 to 39	55
40 to 44	47
>44	50

spondents during the past three years. Reader comments confirm these freezes. The overall increase in median salary of 4% between 1984 and 1985 is slightly below the 4.6% inflation rate. This trend probably reflects the current economic slowdown.

Table 4 shows that consultants and suppliers to the industry reported the highest median incomes ($51,000 and $50,000, respectively), which is really no surprise.

TABLE 9: **Income and educational field—bachelor's degree only, all respondents.**

	Income ($000)						
Discipline	**Lower decile**	**Lower quartile**	**Median**	**Upper quartile**	**Upper decile**	**Change in median '84/'85 (%)**	**Respondents**
Forestry/agriculture	31	41	51	70	85	4	61
Chemistry	34	40	48	61	77	0	125
Mechanical engineering	33	38	47	58	68	6	235
Chemical engineering	31	36	47	58	72	2	221
Civil engineering	36	38	47	62	78	4	61
Electrical engineering	37	44	51	56	70	6	71
Industrial engineering	25	40	45	51	62	2	23
Mathematics/physics	26	42	55	80	108	19	14
Computer science	43	43	43	43	43	72	1
Biology/life science	22	31	41	47	60	17	25
Paper science and technology	32	36	44	54	70	7	226
Environmental science	28	32	40	48	61	5	12
Business	31	37	48	60	78	−2	243
Liberal arts	32	40	50	64	85	0	42
Other	29	35	44	58	75	0	58

TABLE 10: **Income, professional experience, and educational level, all respondents.**

		Income ($000)						
Years since school	**Highest degree**	**Lower decile**	**Lower quartile**	**Median**	**Upper quartile**	**Upper decile**	**Change in median '84/'85 ($000)**	**Respondents**
0 to 4	B.S.	25	30	33	37	42	0	29
	M.S.	37	40	41	44	45	24	11
	Ph.D.	33	37	38	46	46	2	6
5 to 9	B.S.	31	38	43	47	52	−2	45
	M.S.	39	42	47	49	58	−5	11
	Ph.D.	24	37	43	52	59	−24	14
10 to 14	B.S.	35	37	46	55	72	−17	47
	M.S.	42	47	50	72	75	−1	18
	Ph.D.	33	42	46	52	57	−32	18
15 to 19	B.S.	38	46	50	60	75	0	55
	M.S.	46	51	66	85	115	0	17
	Ph.D.	42	44	55	67	70	30	16
20 to 24	B.S.	40	45	58	66	76	18	27
	M.S.	38	49	57	65	93	14	13
	Ph.D.	44	57	59	72	84	1	12
25 to 29	B.S.	39	50	54	67	80	3	17
	M.S.	46	55	61	70	70	3	6
	Ph.D.	0	0	60	90	150	0	5
30 to 34	B.S.	41	53	56	74	80	−15	14
	M.S.	43	47	74	87	87	0	6
	Ph.D.	27	27	40	40	109	0	3
35 to 39	B.S.	46	54	60	68	80	57	15
	M.S.	52	52	52	78	78	29	2
	Ph.D.	40	40	52	52	66	23	3

TABLE 11: **Income, professional experience, and educational field, bachelor's degree only, all respondents.**

	Income ($000)				
Years since school	**Forestry/agriculture**	**Chemistry**	**Mechanical engineering**	**Chemical engineering**	**Civil engineering**
0 to 4	34	38	33	32	32
5 to 9	30	38	38	39	37
10 to 14	47	44	42	51	47
15 to 19	56	49	48	50	47
20 to 24	45	49	53	55	50
25 to 29	52	56	61	53	59
30 to 34	68	61	51	56	56
35 to 39	54	55	56	62	74
40 to 44	0	95	57	0	40
>44	0	0	50	130	0

TABLE 12: **Income and number of years with current employer, all respondents.**

Years	Median income ($000)	Change in median '84/'85 (%)	Respondents
5 or less	40	11	165
6 to 10	36	−2	96
11 to 15	36	0	97
16 to 20	42	10	114
21 to 25	45	12	113
26 to 30	45	9	93
31 or more	44	7	86

TABLE 13: **Income and number of full-time employers to date, all respondents.**

Employers	Median income ($000)	Change in median '84/'85 (%)	Respondents (%)
1	41	2	518
2	46	4	437
3	50	6	298
4	50	2	161
5	50	0	80
6 or more	50	2	44

TABLE 14: **Income and type of wood/pulp/paper company, all respondents.**

Type	Median income ($000)	Change in median '84/'85 (%)	Respondents
Wood products	54	28	15
Pulp/paper/paperboard	44	4	835
Woodlands operations	49	8	46
Chemical byproducts	46	15	7
Corporate or administration	57	11	213
R & D	46	2	162

TABLE 15: **Income and number of years of management experience.**

Employees	Median income ($000)	Change in median '84/'85 (%)	Respondents
None	37	5	91
5 or less	40	8	106
6 to 10	40	0	79
11 to 15	45	2	83
16 to 20	44	4	94
21 to 25	47	9	82
26 to 30	49	8	74
31 or more	49	16	53

TABLE 16: **Income and number of employees managed, all respondents.**

Employees	Median income ($000)	Change in median '84/'85 (%)	Respondents
None	41	5	110
1 to 5	45	9	117
6 to 20	47	11	107
21 to 50	48	4	93
More than 50	49	6	59

For the third time, respondents whose principle work function is administration reported the highest median income (Table 5) at $55,000, followed by those in sales and marketing ($52,000), and consulting ($51,000). No clear trend is apparent when median income is compared with size of employing organization (Table 6), except that the lowest income was reported by respondents who do not know their company's annual sales. Table 7 shows that median income correlates directly with level of supervisory responsibility.

Table 8 shows—as it did in the previous surveys—that the median income of all respondents increases with years of professional experience through 29 years. After that point median income decreases. These data seem to confirm the problem of salary compression: i.e., that salaries of recent graduates and newer employees advance faster and often surpass those of older, more experienced employees.

Table 9 shows some changes from the previous surveys. The highest median income ($55,000) was reported by respondents whose highest degree was earned in mathematics/physics. In second place ($51,000) were respondents whose highest degrees were earned in either forestry/agriculture or electrical engineering. Third place ($50,000) went to respondents who earned their highest degrees in liberal arts. In both of the previous surveys, respondents with their highest degrees in liberal arts reported the highest median incomes. The improved status of electrical engineers probably reflects the growing importance of process control systems to the industry. Other engineers—civil, chemical, and mechanical—did not fare as well and tied with a reported median income of $47,000. (*P&P*'s September 1985 issue discusses the careers and income of "traditional" engineers in detail.)

A comparison of Tables 12 and 13 shows that job hopping pays off to some extent. Respondents who have been with their current employer for more than 21 years reported the highest median income at $45,000, when income was correlated with years with present employer. However, respondents who have had three or more employers in their careers reported a median income of $50,000 (Table 13). The latter group represents 38% of all respondents.

As with both previous surveys, no noticeable difference in income and benefits was seen between geographic regions within the U.S.

RESPONDENTS COMMENT. Many interesting comments were made by survey respondents. Most addressed the problem of salary compression or resentment by salaried professionals that their income has not increased as much in recent years as that of hourly workers at their mills who are covered by union contracts. Several respondents also expressed concern that their careers would suffer because companies had cut back on technical and management training efforts during hard times.

The editors of *Pulp & Paper* hope that this annual survey will be useful to our readers and that it contains some data of interest to all industry professionals. Reader comments on the survey or on *Pulp & Paper* itself are welcome and should be addressed to:

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Use of cornstarch in papermaking is changing with new technology

Exclusive *P&P* survey finds equipment innovations and new furnish chemistry influencing, and probably diminishing, native cornstarch use

By MICHAEL J. DUCEY, Technical Editor

■ Cornstarch has been one of the most popular additives in papermaking since the birth of the industry. Stable price, ample supply, and application versatility are key reasons for its wide appeal. As the industry has matured over the last two decades, the use of cornstarch has been under intense pressure, most notably from the development of retention aids for use in the wet end and now from synthetic latexes in surface applications.

Few starch suppliers seem to be responding to this challenge, while competitors are actively seeking a greater share of the market through research and development. Mills are also asking for and getting discounted purchases, either through purchasing formulas developed in-house or by pitting suppliers against one another when application trials arise. Industry sources agree, however, that cornstarch will remain a major ingredient in papermaking processes for a long time, but whether its consumption per ton of paper produced will change is still in question.

STARCH APPLICATIONS SHIFT. In the early 1970s, cornstarch consumption in the U.S. stood at 1.85 billion lb/year. Many paper manufacturers used it as a major additive in the beater room, mainly to improve interfiber bonding and as a rosin supporter. Much of this consumption has been replaced by gums and retention aids since starch had poor retention after stock preparation. The amount of starch used in these applications was about 115 million lb—7% of the total starch consumed.

The remainder was used ~~in surface~~ applications at the size press or in coating formulations. Not much has changed in these applications, with the possible exception of increased solids and modified starch additions. These applications brought out a number of onsite starch modification developments as the demand for specialized uses across diversified grade structures in many mills became a reality.

Wet-milling corn has changed dramatically over the last half century. Three major shifts occurred: the trend from open-air to enclosed processing, the substitution of powered equipment for processes based on gravity, and the move from batch operations for processing corn products to continuous operations. The integrated mill concept has taken hold, and now innovations in process control and automation are improving on it. New markets have evolved for corn products as well, as total shipments of product continues to rise (13% from 1983 to 1984, with similar projections for this year).

One independent survey named 12 paper companies as the largest consumers of cornstarch (including corrugators), accounting for more than 45% of total consumption. Smaller paper companies, brewers, chemical manufacturers, and food producers account for the other 1.75 billion lb consumed domestically.

WET END ADDITION. Unmodified pearl starch was the chief wet end additive for many years. Today, starch derivatives such as cationic and amphoteric are used. These materials exhibit electrical properties that modify the charge of anionic cellulose, improving formation and retention. Too much nonionic starch is lost in this process, while the modified products are commonly retained at a 70% to 80% level or better, depending on the existing whitewater chemistry, furnish, and turbulence on the wire.

Pulp & Paper surveyed a cross section of U.S. mills on starch consumption. Most of the mills confirmed that starch helps with hydrogen bonding at fiber crossings, enhancing dry strength properties such as burst, tear, and tensile. Common addition points seem to be at the fan pump or the machine chest. Ideally, starch should be added close to the headbox since it is affected by unit

TABLE 1: **Annual consumption of starch by type (million lb).**

Unmodified	2,300
Ethylated	130
Cationic	250
Oxidized	21
Acid-thin boiling	35
Other*	24

* Pregelatinized, dextrins.

operations that may alter its chemical properties. Starch helps "refine" the furnish without mechanical action and can increase drainage efficiency at the former.

Addition rates vary by grade. The survey found the greatest users per ton of pulp to be the coated groundwood producers. Starch consumption between 20 and 30 lb/ton was common, and users cited IGT pick resistance as the property most affected. Retention of fines is increased as well. Producers also felt that runability was improved, resulting in fewer breaks at the size press and in coating due to internal strengthening of the sheet.

Second to coated groundwood were linerboard producers, with application rates in the range of 10 to 20 lb/ton. Although a large number of these producers do not add wet end modified starches, those who do cited improved internal bonding as the major benefit. Many linerboard and containerboard manufacturers reported that market conditions often dictate additive use, and since the market for these products is somewhat depressed today, it is no wonder that many mills have chosen not to add starch. Potato starch, which exhibits an anionic charge naturally (due to bound phosphate), is derivable and used to a small extent. Bleached board producers use starch at rates less than 10 lb/ton, mostly to help promote drainage. One source noted that a few paperboard producers have had good strength improvements from larger (10- to 30-lb) additions.

In fine paper production, the use of starch varies widely. Addition rates fall between 5 and 15 lb/ton—the latter figure corresponds with specialty producers in the heavyweight category. One mill reports addition throughout that range, depending on the softwood-to-hardwood ratio, with the upper-end figure applied for an increased hardwood furnish. Many producers reiterated claims of improved runability after forming.

A number of smaller (tonnage) mills have curtailed their use for a couple of different reasons. In the Northeast, BOD$_5$ increases, particularly in the winter months, will sometimes limit starch addition. In the South, where softwood-rich furnishes are more common, production runs without starch sometimes do not show any adverse effect. Two mills rejected starch use because their end products did not exhibit the desired smoothness characteristics.

The paper product least likely to have starch is newsprint, particularly if the furnish consists of secondary fibers. The survey did find a couple of mills using 10 lb/ton, with users citing reduced linting and increased fines retention. Since 1980, starch has penetrated this market, and as its acceptance continues, newsprint mills could evolve into large starch consumers.

Specialty mills seem to use the most starch as a result of unique product lines. Molded pulp mills fell into this category since many employ excessive amounts to bulk up or thoroughly coat some products.

P&P was not able to obtain data from mills using alkaline papermaking systems, but suppliers have noted that starch consumption could increase as a result of conversions to alkaline. Switching to an alkaline system increases filler additions, which can cause a decline in strength. Starch suppliers feel that this strength loss can be overcome by increased additions of cationic starch.

One supplier estimates the consumption of wet end cornstarch at 250 million lb, or 20% of the total. All of it is of the modified variety, the greatest amount being of the cationic type. Some respondents expressed doubts about the ability of amphoteric starch to work in some mills, particularly where water hardness and pH vary, but these doubts have yet to be substantiated.

SURFACE SIZING. Very little is new in the application of starch for surface sizing. Starch pickup is still a function of its viscosity, percent solids, and temperature, as well as machine speed and paper grade. For dryer-limited machines, higher solids have been successful when machine speeds have increased and lower moisture pickup is desired. Unfortunately, starch does not help opacity, brightness, or gloss, even with an increase in solids. It does, however, increase surface-directional strength, water resistance, and printability when used with certain synthetics.

The greatest single innovation in size-press applied starch is the implementation of the thermochemical starch cooker, particularly Grain Processing Corp.'s ammonia-persulfate starch cooker. This device enables mills to modify pearl starch onsite, thus eliminating the need for delivered modified products. Some 150 of these units are now operating, primarily to vary the viscosity of size press starch. Ethylated starches have been the primary modified starch in this application and still account for a good share due to their ability to provide a uniform film and increase ink holdout.

Calender sizing with starch is prevalent in most paperboard mills. Starch is applied via a nip or sprayed,

FIGURE 1: **Starch consumption by grade.**

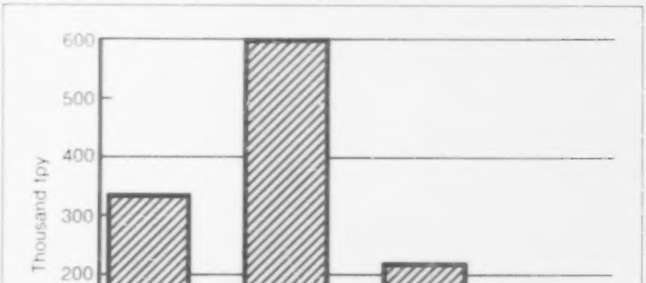
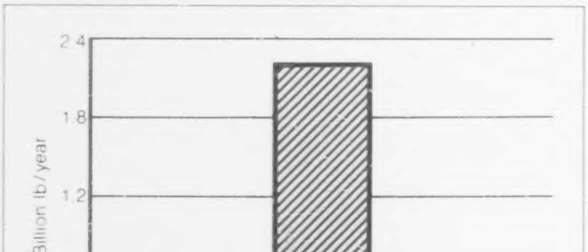


FIGURE 2: **Starch consumption by process.**



and starch consumption is usually less than 5 lb/ton. Again, ethylated starches are gaining an increased share in this application due to their improvement of smoothness and finish qualities. Reduced ink penetration, scuff resistance, and better printability result from proper application, as witnessed by one kraft paper producer and several bleached board manufacturers.

COATING. Starch is the major ingredient of coating formulas and will remain so for the late 1980s due its price, binder characteristics, and adhesion properties. A few trends are developing that could be the beginning of a "revolution" in coating formulations.

A large amount of starch for paper coating is employed as onsite-converted, unmodified cornstarch. One source estimated the breakdown of delivered cornstarch to be 47% thermally converted, 23% enzyme converted, and 30% modified. No rheological advantages have been proven with regard to batch or continuous operations, but some economic benefits are evident. The survey found that large mills tend to have enzyme-converting systems, especially if they coat paper. A good portion of medium-size (500-tpd range) and smaller coating mills make up starch in thermal and thermochemical cookers. A few mills have adopted automated coating kitchens (P&P, Dec. 1984, p. 73, and May 1985, p. 78) that have production loops for adhesive inputs.

Competition for starch used in coating binders may reach a head by the end of this decade. Quality and economics are both reasons for exploring alternatives. According to one source, during the recession of 1972 when paper machine operating rates dropped by 10% or more, synthetic latexes were used to gain quality advantages in certain coated grades such as publication papers. After operating rates increased, the latex additions remained, and their consumption grew. The last recession brought similar activity and a rise in consumption.

In the late 1960s, styrene-butadiene latex (S-B latex) held a 5% share of the coating adhesive market, while in 1980 that share rose to 20%. In the last five years, growth in S-B latex consumption has been close to 1% per year. An industry observer reported an example of how a producer of web offset No. 5 publication paper changed its starch-latex ratio from 12:4 to 6:12, improving gloss by a few points as well as helping certain printability characteristics. These shifts in quality at the lower end of the coated grades will eventually squeeze other middle grades, while No. 1 and other premium grades try S-B latex alone for coating adhesion. Two mills rejected such efforts due to printer problems with fine paper, but publication paper producers supported this substitution.

European products, with their high synthetic latex content, have been well received, perhaps pushing U.S. producers to improve quality with this material. Europeans do not have the starch available (most of their starch is of the cationic potato variety), and with their increased use of inorganics in the sheet (alkaline papermaking), it is no wonder they challenge U.S. products.

Mills have turned to ethylated starch as a binder to upgrade printing quality, and with a $0.70 to $0.80/lb cost differential, starch consumption should grow according to industry growth as a whole.

Coating equipment has changed some formulations involving starch. The installation of short-dwell-type coaters has altered rheological characteristics of some coatings, and starch reevaluation is needed. One supplier noted that starch must be converted "thinner," and some of its binding power is lost. In order to regain that power, solids are cut back and S-B latex is used. The survey found that the starch component in any coating application is between 14% and 19% (by weight) of the formula, depending on the equipment employed, paper grade, and desired surface characteristics. ■

FIGURE 3: **Historical binder consumption activity.**

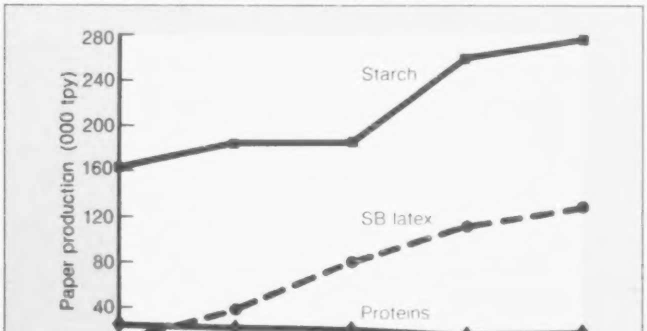
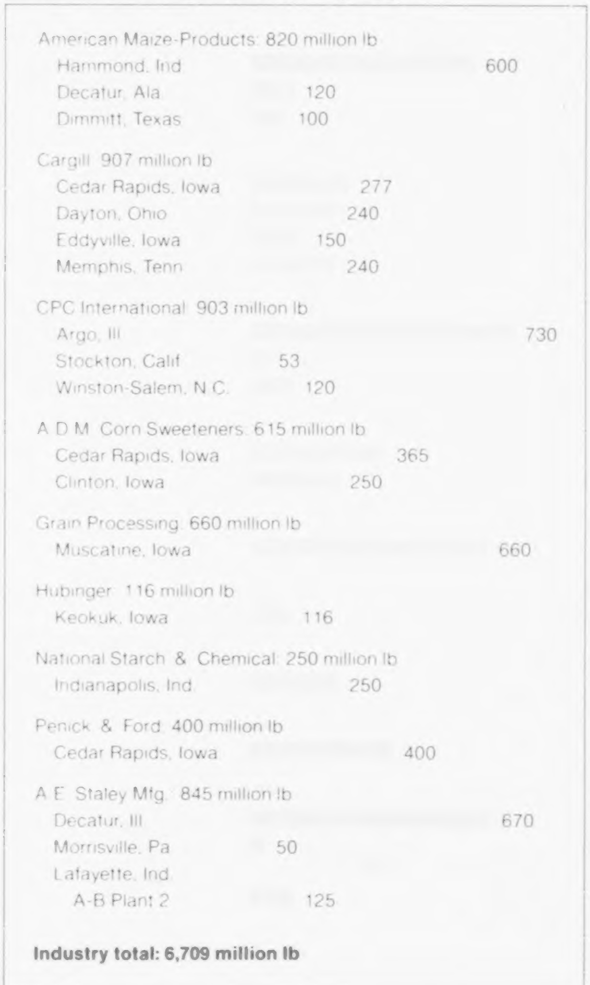


FIGURE 4: **Starch capacity for industry suppliers.**



P&P survey identifies some coating mill trends and supplier strategies

Exclusive *P&P* survey of top U.S. coated paper producers reports on coated production, use of pigments, additives, binders, new technology

By SHARLENE GRAHAM

■ Following economic setbacks in the paper industry during the early 1980s, the coated paper market has tightened considerably. Both producers of coated papers and their coating ingredient suppliers have become increasingly conscious of today's fierce competition. This was particularly evident during a recent *Pulp & Paper* survey, when most mills and suppliers would not comment on coating material makeup because they felt it was a highly proprietary subject. Therefore, this article does not examine individual mills and their particular methods of coating but rather discusses coating trends as a whole, based on input from a sampling of the nation's larger coated paper producers.

COATED GRADE PRODUCTION. Of the companies responding to the survey, the majority produced coated groundwood, closely followed by coated free sheet and coated folding boxboard. Opinions were also taken from coated specialty and carbonless paper manufacturers. The surge in coated groundwood production is due mainly to the escalating demand for Nos. 4 and 5 grades of lightweight coated (LWC) papers for periodicals, catalogs, and directories.

High postal rates have put pressure on printers to turn out lower-weight products, forcing their paper suppliers to manufacture low basis weight paper while retaining heavier basis weight qualities, such as high brightness, high gloss, and good ink holdout. Printing presses are also increasing speeds and runs, and they are using more color than ever before. Thus, paper strength has become more critical.

Although demand is up, some mills are not running at full capacity due to the high volume of imported coated papers. API estimates that a half million tons of coated paper will be imported by the U.S. in 1985, a 68% (annualized) increase over last year. Most grades are stable, with the possible exception of coated specialties. One mill producing photographic paper, a high-cost item, used to work three shifts a day but is "barely holding one now."

PIGMENT USAGE. Mills are still using commodity pigments for coating, such as kaolin, calcium carbonate ($CaCO_3$) and titanium dioxide (TiO_2). Although a few mills admitted to using or testing calcined clay as a TiO_2 extender, the majority questioned doubted its ability to perform according to their specific needs. There was also little enthusiasm for plastic pigment, other than with coated specialty producers. One fact is clear—price in the end-user market usually dictates the consumption of these additives.

In a separate survey for the *1986 Pulp & Paper Buyers Guide*, suppliers of coating pigments were asked to comment on the market for their products. Producers of kaolin clays are currently trying to re-establish the list prices of 1982, which suffered from heavy discounting during the two years that followed. One company predicts no increase in filler clays because of the "rough time" being experienced in the uncoated fine paper market today. Still another bullish company predicts overall prices to exceed the inflation rate, simply so the suppliers will recoup the inadequate returns from discounting. This company went on to say that "failure to improve prices will ultimately result in a tight supply situation in 1987 and beyond since expansion capital cannot be justified."

Titanium dioxide is expected to tighten further in the 1980s. One supplier believes the market will experience more spot shortages in specific grades, mostly attributed to low inventories. Increased demand by offshore markets will also affect availability.

As mentioned above, many paper companies are experimenting with TiO_2 extenders. Chief among these is calcined clay, which costs typically one-fourth the price of TiO_2 on a tonnage basis. However, most mills will continue to use TiO_2 at their current consumption rates since it is superior in enhancing opacity and brightness and no plastic or synthetic has yet proved to be quite as

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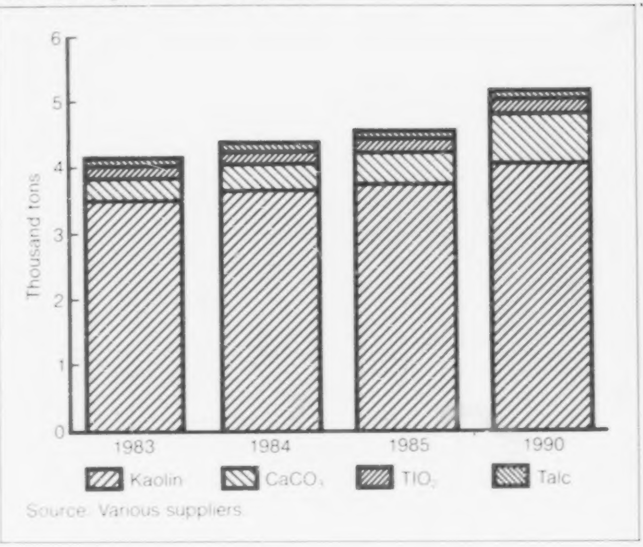
effective.

Calcium carbonate is beginning to compete with kaolin to some degree, particularly with the development and implementation of alkaline papermaking. Some suppliers see growth of these systems to exceed 50% of the producing market by 1990. Precipitated $CaCO_3$ is of premium coating quality but is fairly expensive due to a tight market. One mill predicts even tighter availability if suppliers do not expand quickly enough to meet the technological changeovers. Even so, Pfizer Inc. announced in July that it planned to "hook up" with several paper mills on the East Coast in hopes of successfully producing $CaCO_3$ onsite, in order to eliminate freight costs.

The situation in Europe has also been of concern to U.S. papermakers. Producers of the EEC have been quick to adapt to alkaline systems since clay is not available to them domestically and the strength of the U.S. dollar has curtailed imports. This sets up a scenario in which their abundant supply of $CaCO_3$ and lack of clay pushes the acceptance of alkaline papermaking, giving them the jump on the market for "longer-life" papers and at the same time improving their production costs. Even if the dollar does ease, this lower production cost (due mostly to reduced fiber requirements) may give them the edge to maintain their strong export status.

FIGURE 1: **Pigment and filler growth.**



Source: Various suppliers.

TABLE 1: **Survey participants.**

Coating lines surveyed	47
Clay users	100%
Titanium dioxide users	75%
Calcium carbonate users	45%
Calcined clay users	20%
Plastic pigment users	5%

ADDITIVES, BINDERS. All mills surveyed reported concerted efforts to introduce more synthetic additives. Acetates, styrene-butadiene rubbers (SBRs), and polyvinyl alcohols are rapidly replacing starches, proteins, and other organic ingredients as the additives of choice. One mill currently producing clay-coated boxboard is aiming for a 100% synthetic coating consisting of plasticized pigments and latex instead of protein. This is being attempted "not so much for cost effectiveness, which is a factor, but for better print characteristics, such as smoothness and ink holdout." Because acetates run approximately $0.20/lb less than SBRs, they tend to be used more often. Nevertheless, market demand for better printed gloss in web offset grades requires more synthetic usage in general.

One mill producing coated specialties is among "the very few" using acrylic as a binder. This mill maintains that it has several properties which contribute to glueability and gravure printability. Although acrylic binders are used fairly extensively in Europe, their prices in the U.S.—according to one mill—"border on the ridiculous" and remain beyond the range of most coated paper producers. As far as dispersing agents are concerned, most mills seem to use calcium stearate due to its efficiency and price.

In addition to employing more synthetics in their formulations, two mills also mentioned the use of "safe" additives, such as dyes and insolubilizers, which are formaldehyde-free.

NEW APPLIED TECHNOLOGY. Half of the mills surveyed indicated that they have recently made or will make changes in coater technology, either to accommodate higher output or simply to update old equipment.

On-machine coaters and double-coating equipment have been added to several mill production lines, many being of the "short-dwell" variety. One mill, over a four-year period, has gone completely to closed-loop controls of its off-machine coater and is making plans for an automated coating kitchen in keeping with the fully automated coating concept. Expansions both large and small were noted, from incremental speed increases with little capital investment to multimillion-dollar projects involving capital equipment as well as new production lines.

One southern U.S. producer volunteered the point that developments in simultaneous two-sided coating were seen as unfeasible four years ago (that company had investigated the technology for application on LWC stock). However, now that certain European producers have successfully installed the equipment, implementation of this technology cannot be far off in the U.S.

The mill consensus regarding technology in general appears to be that "automation should be moving faster than it is." But this depends on the specific manufacturing conditions. One mill, for instance, has small coaters constantly changing short runs. It would be almost impossible to incorporate continuous coating into such an operation and very expensive to monitor the process for each run. Still, this mill is looking for more automation in the areas of solids control and other on-machine coating parameters.

Whether to allow more people to do more work or to allow fewer to do the same work was a topic raised by a mill manager concerned with the effect of coating automation on human labor. "People can argue to the contrary, but I think we have a different labor force than we had 25 years ago. Today, a job is not a worker's entire life. It's a sideline in most cases, and that is reflected in the quality of his or her work. So many times it does behoove a mill to replace workers with a machine. Coating paper is being improved by automation—I'm convinced of that." ■

Curriculum correction

I am writing this letter to correct errors and misconceptions in your article entitled "Today's pulp and paper schools stress high-tech specialization," which appeared in the September 1985 issue of *Pulp & Paper*.

To correct the record, the Univ. of Maine at Orono offers two programs at the Bachelor of Science level that are relevant to the paper industry—not one program as suggested in your article. The Univ. of Maine offers both the Bachelor of Science degree in chemical engineering with an option, or minor concentration, in paper engineering, and the Bachelor of Science degree in pulp and paper technology. It is the Bachelor of Science degree in pulp and paper technology that was incorrectly named and unsuccessfully described in the article.

In response to the statement "two of the pulp and paper schools surveyed . . . do not even require freshman English," I wish to point out that the Univ. of Maine requires freshman English, specifically, three credit hours of composition. In your article you used Table 1 to summarize the requirements for the undergraduate degree at institutions offering pulp and paper programs. There are several errors in the table regarding the Univ. of Maine program. Physics is not shown—the Univ. of Maine requires eight credit hours of physics, not eight credit hours of physical education as erroneously stated in the table. Also, the table neglects to indicate that Univ. of Maine students are required to take statistics (three credit hours) and computer science (two credit hours).

The second program which is relevant to pulp and paper education at the undergraduate level is the Bachelor of Science degree in chemical engineering. Unfortunately, this program was not mentioned in your article. The B.S. in chemical engineering degree is fully accredited by the Accreditation Board for Engineering and Technology (ABET) and contains a sequence of courses as a technical option or concentration. Many of the chemical engineering students at the Univ. of Maine elect to take their technical elective concentration in pulp and paper engineering. Two other technical options open to chemical engineering students are process control technology and polymer science and engineering. A technical option requires a minimum of 9 credit hours in the student's field of concentration. In the pulp and paper option, students choose from courses in wood chemistry, fiber physics, pulping technology, paper technology, two pulp and paper laboratory courses, and mathematical modeling of pulp and paper systems.

For comparison, the table below summarizes the degree requirements for both B.S. level degrees.

Joseph M. Genco
Calder Professor of
Pulp and Paper Engineering

Credits required for undergraduate degrees related to pulp and paper at the Univ. of Maine, Orono, Maine

Requirement	B.S., Pulp and Paper Technology	Chemical Engineering—Pulp and Paper option
Biology	4	0
Chemistry	23	24
Computer science	2	2
Engineering		
General	15	9
Chemical	17	36
Electrical	3	3
English	3	3
Mathematics	16	16
Physics	8	8
Pulp and paper science	18	9
Statistics	3	3
Electives (free)	3	0
Humanities/ Social science	18	18
Credits required for graduation	133	131

Nonwovens markets

Nonwovens markets and Fiber Structures Report is a new biweekly newsletter service covering developments in the worldwide nonwovens industry. Reporting on supplies and materials, costs and prices, and technology and the law, the first issue will be published Jan. 10, 1986. End use markets, including industrial, household, hospital, apparel, and others, will be covered. The news service will summarize industry activity in every important nonwovens producing and consuming country. The publication is designed for industry decision-makers, particularly those involved in corporate management, research and development, sales and marketing, production, and purchasing. Each six-page issue will contain in-depth reports, key statistics, plus analysis and interpretation of issues. Price for a one-year subscription (25 issues): $259 ($279 outside North America). Write: Miller Freeman Publications, 500 Howard St., San Francisco, Calif. 94105.

Paper additives survey

H&H Survey of Paper Additives is a 255-page reference guide to paper additives, process aids, and coating ingredients, designed for use by the technical, manufacturing, and purchasing departments of paper companies. It contains descriptions of 718 different products. The survey covers dry- and wet-strength resins, internal and surface sizes, saturants, retention aids, drainage aids, agents to prevent scale, pitch control agents, microbiocides, defoamers, cleaning agents, felt conditioners, additives for corrosion control, agents for creping aids, filler clays and carbonates, titanium dioxides, extenders, coating adhesives and pigments, dispersants, coating additives, as well as some specialty materials. Pulping and bleaching agents are not included. Price: $375 or $750 for three copies, plus $5 handling charge per copy. Write: H&H Consulting Group, 10 Tuccamirgan Rd., Flemington, N.J. 08822

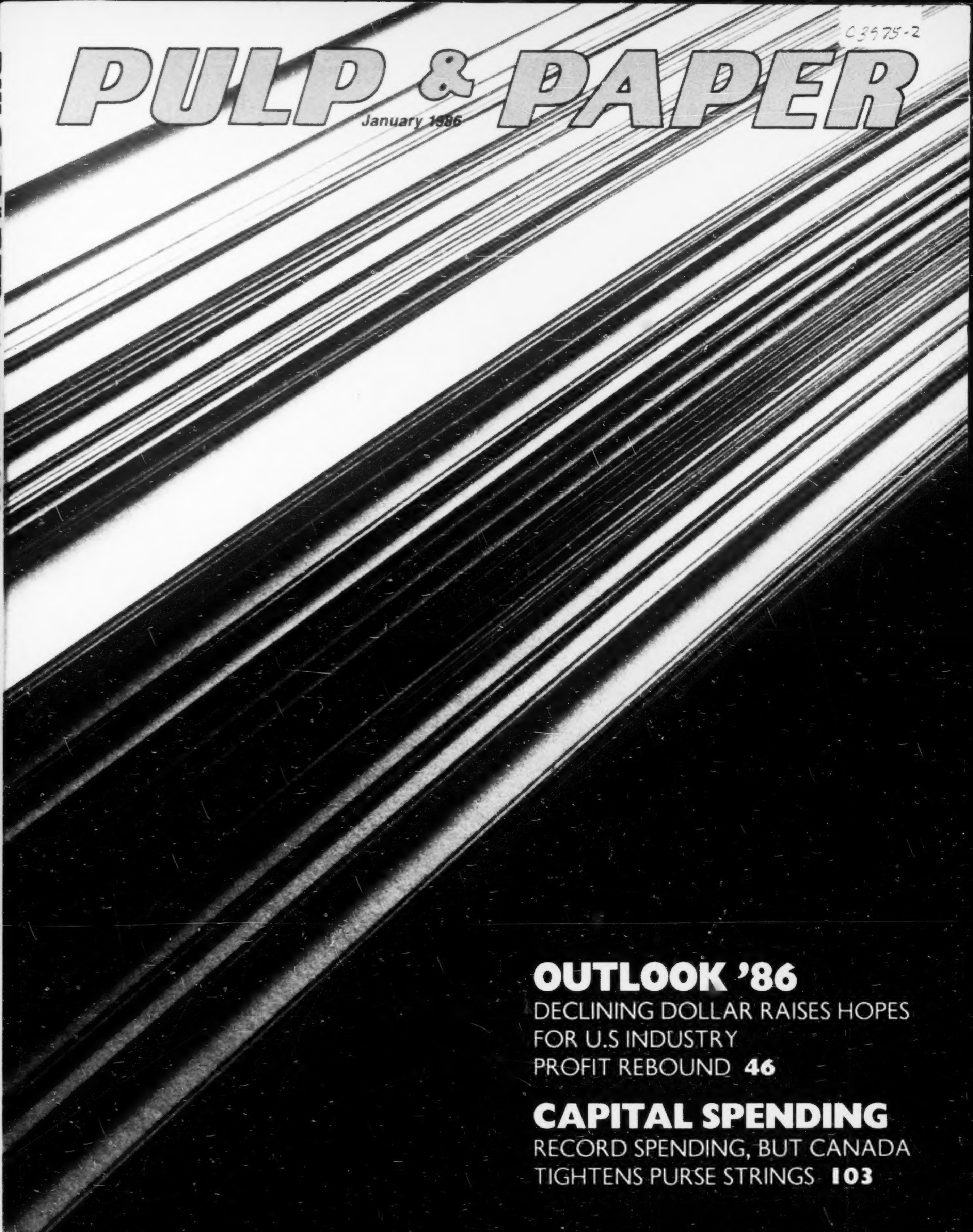
Selection guide

Belt Filter Press Selection Guide provides up-to-date information on commercially available belt filter presses. It covers recent developments in belt filter presses and compares basic features. Experience of suppliers is tabulated for each application. Price: $70. Write: McIlvaine Co., 2970 Maria Ave., Northbrook, Ill. 60062.

C3975-2

PULP & PAPER

January 1986



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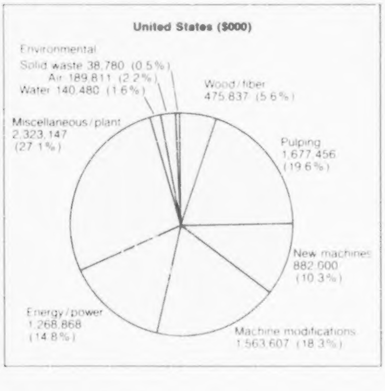

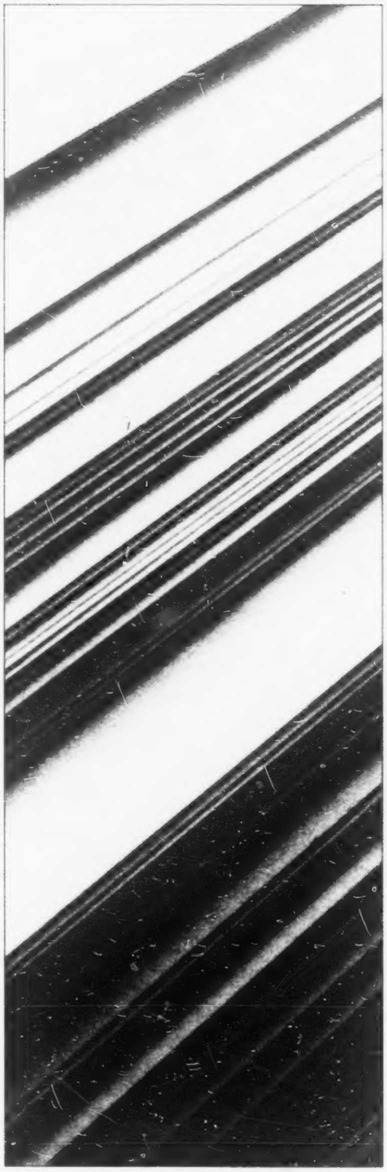

THE COVER

***1986 looks like a pretty good year for the U.S. forest products industry in both the paper and solid wood sectors; brighter times for the industry should mirror improvements in the nation's economy.* (Photo courtesy of Boise Cascade Corp.)**

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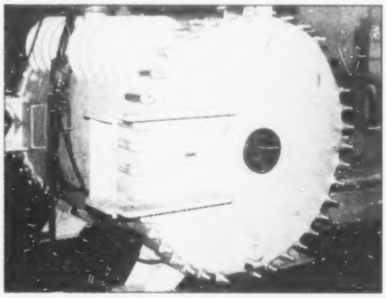

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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Subscriptions & Address Change: Sent without charge in the U.S.A. & Canada (upon written request) to individuals in pulp, paper and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $50.00 a year in the U.S. All subscriptions to other countries: $70.00 a year, except Europe and Mediterranean, $80.00 (air service included). Single copy, $4.50, except Buyers Guide, $30.00. Photocopies of articles and complete microform volumes available through University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106.

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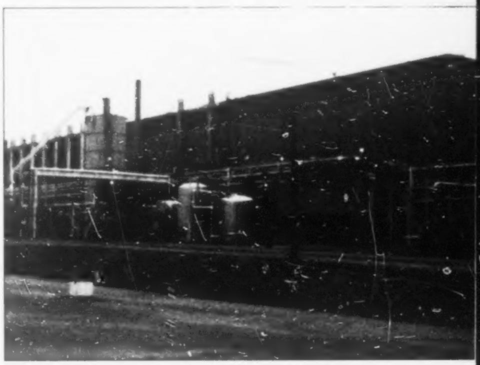

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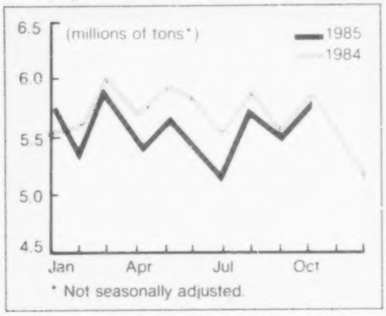


* Not seasonally adjusted.

U.S. production of paper and paperboard totaled 5.8 million tons in October, 1.5% less than the same month last year, according to the American Paper Institute. The latest trend data show total production for 1985 moving toward 66.8 million tons, API said. That would be 2.5% lower than the record 1984 mark of 68.5 million tons. While paper and board markets improved and GNP rose in 1985, these positive factors were not enough to offset higher inventory levels and the negative impact of the strong dollar on foreign trade, API said.

Among major grades, uncoated free sheet continued to strengthen, but other printing and writing papers were weak. Containerboard may be poised for an upswing following some inventory reduction, although production for export is still depressed. Corrugated box shipments reached a record 25.5 billion ft² in October, the Fibre Box Assn. said, while containerboard inventories fell 5%.

Canadian newsprint shipments were off a slight 0.7% through October compared with last year, but pulp shipments registered a 4.4% gain. Operating rates continued at 92% for newsprint mills and dropped slightly to 96% for pulp mills. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Oct.	449	−5.3	5,462	−2.1
Uncoated groundwood (s)	Oct.	147	5.0	1,498	−5.9
Coated paper (s)	Oct.	481	−12.1	5,931	−5.2
Uncoated free sheet (s)	Oct.	870	8.8	9,724	4.6
Other printing/writing	Oct.	116	−5.7	1,340	−8.9
Total packaging and other paper (s)	Oct.	450	−6.3	5,254	−7.7
Tissue	Oct.	432	1.6	4,932	.7
Total paper	**Oct.**	**2,944**	**−1.5**	**34,143**	**−1.6**
Unbleached kraft paperboard	Oct.	1,405	−3.6	16,518	−5.5
Semichemical medium	Oct.	447	1.6	5,092	−2.8
Bleached paperboard	Oct.	333	3.8	3,978	−3.1
Recycled paperboard	Oct.	694	1.6	7,733	−.5
Total paperboard	**Oct.**	**2,803**	**−4.2**	**32,939**	**−3.2**
Total U.S. paper and paperboard output	**Oct.**	**5,823**	**−1.5**	**67,463**	**−2.6**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Sept.	4,432	−2.6	54,162	−3.1
Market pulp production	Sept.	518	5.3	6,799	−.5
Wastepaper consumption at paper/board mills	Sept.	1,252	2.4	15,178	−3.9
Pulpwood consumption (cords)	Sept.	6,904	−4.7	85,412	−2.9
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	Oct.	25.515	2.5	226,157[6]	−0.2
Containerboard inventories at U.S. box plants and mills	Oct. 1	2,560	−5.0		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Sept.	981	6.6	11,084	4.1
Imports of Canadian newsprint	Sept.	714	10.4	8,123[6]	5.5
U.S. paper exports (including products)	Sept.	353	−10.4	4,027	−10.0
Exports of unbleached kraft linerboard	Oct.	152	2.0	1,738	−21.0
Exports of woodpulp	Sept.	298	4.6	3,821	5.2
Norscan pulp inventories[4]	Oct. 31	1,511	8.2		
Norscan pulp operating rates[4]	Oct.	91%	79%	87%	86%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Oct.	788	−.5	7,440[6]	−.7
Operating rates	Oct.	92%	93%	92%	92%
Inventories held by U.S. consumers	Oct. 31	1,495	2.7		
Other paper/board shipments	Oct.	304	21.6	2,540	10.7
Woodpulp shipments (export only)	Oct.	585	1.9	5,778[6]	4.4
Operating rates	Oct.	96%	98%	88%	87%

1. American Paper Institute 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council 4. North American/Scandinavian paper-grade market pulp 5. Canadian Pulp & Paper Assn. 6. Not annualized (s) = Shipments

LINERBOARD: Rebound in demand should lift prices

Grade structure: Unbleached linerboard is made in a wide range of basis weights. Standard weight in the U.S. is 42 lb/1,000 ft², but other important weights are 26 lb, 33 lb, 69 lb, and 90 lb/1,000 ft². Major use is in domestic corrugated container production, although about 12% of output is exported.

Production: Unbleached kraft linerboard production dropped about 6.2% to around 15.0 million tons in 1985, reflecting an estimated 1.0% decline in corrugated box shipments and a plunge in export shipments.

The strong dollar has been a major factor behind linerboard's poor performance. Waves of imported goods entering the U.S. have depressed industrial production and with it, domestic corrugated box demand. And the super dollar has made it difficult for U.S. liner exporters to compete at price levels prevailing in overseas markets. As a result, liner exports declined about 13% in 1985 to an estimated 1.7 million tons, following an 8.4% decline the previous year.

The combination of sluggish box demand and the roughly 400,000-ton decline in export shipments over the past two years caused a buildup in containerboard inventories. Stocks at box plants and mills hit a peak of 3 million tons (8.1 weeks) in April. High inventory levels led to infighting among producers for orders, and the open market price for liner in the eastern U.S. slid from $350/short ton in late 1984 to $260 and lower by last summer—an unprofitable level for many mills.

The market began to take on a better tone in late fall due to some improvement in demand combined with widespread mill production curtailments. As a result, inventory levels by Oct. 1 had declined to around 2.5 million tons and appeared to be heading even lower.

Capacity trends: Poor profitability has reduced the rate of linerboard capacity expansion to only 1.6%/year over the 1986-88 period, according to the latest American Paper Institute survey. Chesapeake Corp. of Virginia is scheduled to start up a new 315,000-tpy liner machine in November, but this will replace an existing machine.

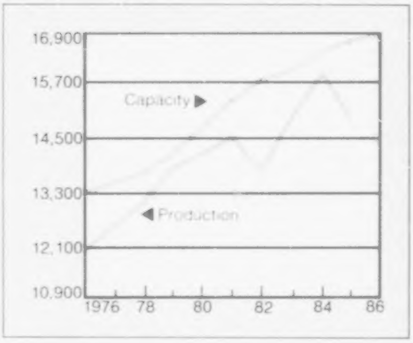
No additional new machines have been announced. But incremental expansion/cost reduction projects—such as the addition of new high-pressure presses and secondary fiber lines—may cause somewhat faster than expected capacity growth over the next few years.

Future outlook: The decline in the dollar should help revive U.S. box demand as well as linerboard export shipments. U.S. corrugated box shipments should closely match the 3% increase in industrial production most economists project for 1986. This would cause about a 6% increase in liner output for domestic use after a 4% decline last year due mainly to inventory reduction.

Liner exports could increase about 9% to 10% as the decline of the dollar reduces the cost advantage of overseas producers and causes some firming in export price levels. Overall U.S. liner production should rise about 5.8% to 15.9 million tons, resulting in an operating rate of 93.1% in 1985.

Pricing: Producers tried unsuccessfully to raise linerboard prices in the eastern U.S. by $30/ton to $290 last September. The price increase may begin to stick in the first quarter of 1986, however, due to improving demand and low inventory levels. If economic growth continues, attempts at one or two further $20 to $30/ton price hikes are possible in late spring and early fall—but price hikes will not be easy since the industry will still not be running quite at maximum (95% or more) capacity. (Historical year-end prices for 42-lb liner delivered in the eastern U.S. open market are as follows: 1985, $260; 1984, $350; 1983, $290; 1982, $250; 1981, $270; 1980, $270.)

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

	1983	1984	1985e
Production	16,037	15,035	15,905
Capacity[1]	16,565	16,780	17,090
Utilization rate	96.8%	89.6%	93.1%
Imports[2]	70	55	60
Exports[2]	1,917	1,650	1,810
Apparent U.S. consumption	14,190	13,430	14,155
lb/capita	120.8	114.0	117.4
GNP ratio	8.66	7.99	8.17

e = Estimate
1 1985 American Paper Institute capacity survey
2 Commerce Dept

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity	Market share (%)
1. Stone Container	1,870[1]*	10.9
2. International Paper	1,570	9.2
3. Weyerhaeuser	1,340	7.8
4. Union Camp	1,330*	7.8
5. Georgia-Pacific	1,040[2]*	6.1
6. CCA	975[3]	5.7
7. Temple-Inland	780[4]	4.6
8. Owens-Illinois	750	4.4
9. GNN	745	4.4
10. Westvaco	670*	3.9

Market share of top five companies:
41.8%

Market share of top ten companies:
64.7%

Total U.S. capacity (1986):
17.090 million short tons

1 Includes planned acquisition of Champion International's 1,865-tpd Missoula, Mont., mill
2 Includes rebuild of No. 1 swing machine at the Monticello, Miss., mill to mainly liner production
3 Includes rebuild of two machines and shutdown of one machine at Fernandian Beach, Fla., in early 1986
4 Includes 50% interest in Georgia Kraft Co., jointly owned with Mead. Mead's share is less since it includes some coated kraft board. T-I's capacity excludes the new 500-tpd Ontario, Calif., recycled liner mill
*Exact estimate difficult due to kraft paper production

SALES/EARNINGS

Canadian paper companies report modest improvements in third quarter

Canadian pulp and paper companies eked out a small 4.3% increase in earnings on a 6.9% rise in sales for last year's third quarter compared with a year earlier. But aftertax profit margins continued at a depressed 2.3%, reflecting weak prices for market pulp, newsprint, and lumber. Of the companies surveyed by *Pulp & Paper*, seven showed profit increases, four displayed declines, and three reported losses for the period.

Companies in eastern Canada continued to turn in the strongest profit performance. A 60.3% increase in earnings on a 16% rise in sales for the third quarter was reported by Abitibi-Price Inc. President and CEO Bernd Koken said that the profit increase resulted from improved contributions from most operations, the addition of two paper merchants acquired this year, and the higher U.S. exchange rate. Koken expected fourth-quarter demand to be healthy and operating levels to remain steady, even though prices for newsprint and other printing papers remain under pressure.

Consolidated-Bathurst Inc. posted a 7.2% rise in earnings on a 12.2% increase in sales for 1985's third quarter. Higher sales of newsprint and groundwood specialties were partially offset by lower sales of bleached kraft pulp as well as mechanical pulp and corrugating medium from the struck Bathurst, N.B., mill. Reduced losses from the Bridgewater, U.K., newsprint mill also contributed to the earnings improvement.

Great Lakes Forest Products Ltd., however, reported a loss of $1.3 million for the third quarter compared with a profit of $5.4 million a year earlier. The red ink "resulted mainly from depressed selling prices for kraft pulp and fine papers and lower shipment volumes of newsprint, kraft pulp, and stud lumber," according to Charles J. Carter, GLFP's chairman and president. Fraser Inc. reported a $2.4-million loss for the third quarter compared with a loss of $2.9 million a year earlier. "Fine paper and coated groundwood paper markets showed significant weakened during the third quarter, which meant machine downtime at the Madawaska [Maine] mill for both product lines," Fraser company sources reported. Although new markets were found for pulp produced at the Atholville, N.B., sulfite mill, pulp markets nevertheless remain "very oversupplied."

West Coast woes. Profit margins of west coast producers continued to be depressed in the third quarter, although some companies posted higher results than the same period in 1984. British Columbia Forest Products Ltd., for example, reported an 87.5% increase in earnings on a 1.1% rise in sales from depressed levels a year earlier, despite "unsatisfactory demand and prices for kraft pulp and lumber coupled with intense competitive pressure on sales of newsprint." More favorable market conditions prevailed for the company's lighweight coated paper, but some softening occurred late in the quarter.

Canfor Corp., however, reported a net loss of $14 million for the third quarter compared with a loss of $5.8 million a year earlier. The company blamed depressed prices for lumber and pulp, further production curtailments, and costs related to downsizing and restructuring operations. Another company with heavy exposure to pulp and wood products—Westar Timber Ltd.—however, was able to show a divisional operating profit of $6.6 million compared with $8.6 million in 1984 (not shown in table). ■

Canadian paper industry third-quarter results.

	1985 third quarter (C$000)			
Companies	**Sales**	**Change 1985/84**	**Earnings**[1]	**Change 1985/84**
Abitibi-Price Inc.	C$633,544	16.0%	C$25,417	65.7%
British Columbia Forest Products	277,800	1.1	4,500	87.5
Canfor Corp.	276,300	−2.3	(14,000)	n.m.
Cascades	69,135	47.1	4,057	45.9
Consolidated-Bathurst	437,600	12.2	22,400[2]	7.2
Crown Forest Industries	230,600	11.0	7,600	347.1
Domtar Inc.	525,700	3.2	19,300[3]	−15.4
Donohue	101,700	−1.1	3,800	−47.9
Fraser Inc.	131,432	3.8	(2,368)	n.m.
Great Lakes Forest Products	158,022	3.9	(1,343)	n.m.
MacMillan Bloedel	597,100	−1.0	12,100	−11.7
Rolland Inc.	73,900	4.5	1,052	−25.3
Scott Paper Ltd.	62,440	14.0	3,156	13.7
Weldwood	170,442	25.0	3,406	n.m.
Total	**C$3,745,715**	**6.9%**	**C$89,077**	**4.3%**

[1] Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
[2] Excludes 1985 extraordinary gain of $7.1 million.
[3] Excludes extraordinary gains of $5.8 million in 1985 and $4.2 million in 1984.
n.m. — Not meaningful.

LABOR

Talks in British Columbia scheduled; Westar opts out

Thirteen of the 14 pulp and paper companies in British Columbia that normally negotiate jointly will again be represented as a group in contract negotiations beginning Jan. 31, three months earlier than normal, according to the Pulp & Paper Industrial Relations Bureau, the mills' bargaining agent.

In a Nov. 28 letter to the Canadian Paperworkers Union and the Pulp, Paper & Woodworkers of Canada—unions representing most of the primary industry's workers in the province—PPIRB president Eric Mitterndorfer said the companies accepted the unions' Oct. 25 invitation to start talks on Jan. 31. Three-year contracts

LINERBOARD

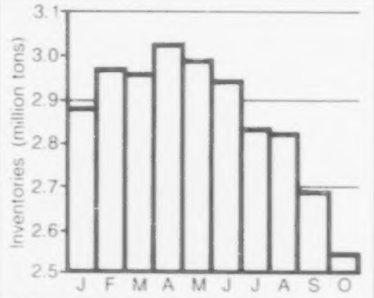
U.S. containerboard mills try for price hike again

Healthy domestic demand combined with widespread mill curtailments have caused the U.S. containerboard market to show further signs of firming. Stone Container Corp. recently told customers that it would no longer accept linerboard orders below the $290/short ton level beginning Jan. 1. Other producers were also expected to either reaffirm to the $290 list or announce some form of staged price increases. One containerboard mill, for example, reportedly announced a $10/ton increase for January and a $20/ton increase for March.

The improving tone of the market was reflected in containerboard inventories at box plants and mills, which dropped to 2.47 million tons (5.8 weeks of supply) on Nov. 1 from 2.56 million tons (6.2 weeks) on Oct. 1. The combined box plant/mill figure for November was the lowest since November 1983, and the figure for box plants alone (2.12 million tons) was the lowest since February 1980. Mill stocks on Nov. 1 dropped to about 350,000 tons, which was their lowest level so far this year.

The decline in inventories partly reflected strength in corrugated box shipments, which in October totaled 25.515 billion ft², up 2.5% from a year earlier and "the highest level of shipments the industry has ever had," according to the Fibre Box Assn. This brought the decline in year-to-date shipments to 1.3%.

But a more important factor in the drop was probably due to a rash of mill curtailments, prompted by market-related downtime, financial difficulties, strikes, flooding, machine rebuilds, maintenance problems, and an environmental dispute. As a result, such grades as lightweight linerboard, corrugating medium, and mottled linerboard are reported to be in relatively tight supply.



Source: Dean Witter Reynolds Inc.

Total containerboard inventories at U.S. mills and box plants for the first ten months of 1985.

U.S. linerboard exports to major importing countries, January through September, 1985.

Country	Quantity (metric tons)	Percent change from 1984	Value ($000)	Percent change from 1984
United Kingdom	134,904	−32.5%	$41,161	−53.8%
Fed. Rep. Germany	41,712	−56.4	11,624	−63.7
Italy	61,190	−39.7	18,474	−44.6
Spain	27,332	−28.5	7,7518	−35.5
Netherlands	18,022	−37.3	6,357	−35.5
France	12,642	32.2	3,975	45.9
Japan	82,572	−12.8	21,935	−31.2
People's Rep. China	64,123	−20.2	14,609	−38.9
Hong Kong	66,661	6.7	19,461	9.3
Philippines	41,057	−22.1	11,993	−32.4
Malaysia	21,937	−6.8	6,668	−23.3
Singapore	17,727	−37.6	4,954	−49.1
Costa Rica	48,900	−10.7	13,234	−21.6
Colombia	41,519	−27.8	12,234	−35.0
Honduras	35,083	25.5	9,319	5.5
Panama	35,516	−22.5	9,335	−34.5
Ecuador	29,486	−14.2	10,309	−10.2
Guatemala	22,230	25.7	6,904	25.1
Israel	41,213	−11.9	12,186	−19.0
Saudi Arabia	28,547	0.3	7,048	−26.9
Nigeria	11,759	−2.1	4,073	2.0
Egypt	15,984	69.8	4,029	15.6
Canada	22,029	−12.6	7,687	−9.3
Mexico	17,888	131.1	5,785	124.6
Total*	**1,146,045**	**−17.6%**	**335,436**	**−25.7%**

*All countries, including those not listed.
Source: U.S. Dept. of Commerce.

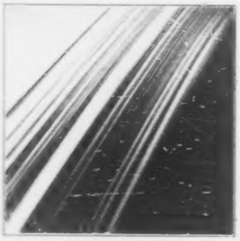
Prices still competitive. Despite all of the production outages, prices in the eastern U.S. independent box market remain competitive. Most linerboard is still selling at about the $250 to $260/short ton level at best—although low spot prices are reportedly becoming more difficult to obtain on new business.

Box prices continued to erode in October and the National Assn. of Purchasing Management reports that they dropped further in November. This puts pressure on margins on independent converters and makes a large price hike on rollstock more difficult for them to swallow. Estimates of box prices (in terms of linerboard) place most national account business at the $280 to $290/ton level.

Some firming in Europe. The European kraft linerboard market has firmed considerably, which some producers attribute to downtime taken in October. Tonnage at many mills is sold out to February, and observers anticipate a price rise.

Price levels have moved up closer to the European Community minimum of $333/$353/$368 for 175+/150/125-g liner and most observers feel that offers below the minimum will disappear by January.

Prices in Japan have been around the $280 level. Lightweight (125-g) liner in Singapore has been at the $280 level and as low as $270 in Hong Kong, according to one agent. ■



ISSUE FOCUS: **OUTLOOK '86**

FOR U.S. PAPER INDUSTRY, ECONOMY, 1986 LOOKS LIKE A PRETTY GOOD YEAR

"Reflation" may be a key word as rises in inflation, economic activity are likely; declining dollar will aid paper and solid wood producers

All things considered. 1986 looks like a reasonably good year for the U.S. forest products industry in both the paper and solid wood sectors. Brighter times for the industry will mirror improvements in the nation's economy. where "reflation" seems to be a key word.

Sensitive to last year's economic slowdown—and perhaps to elections later this year—Federal Reserve chairman Paul Volcker has made it clear that he plans no sudden halt to growth in the money supply. As a result. analysts plan on a hotter economy in 1986. fueled by higher inflation. Analysts disagree as to whether inflation will edge up roughly a point or react sharply to the bigger money supply.

The optimists could look back as far as 1985's third quarter. when GNP growth accelerated sharply. After some disappointing preliminary estimates. Commerce Dept. statisticians produced a final figure of a 4.3% annual growth rate. The preliminary estimate of third-quarter growth was 3.3%. In comparison with the first quarter's tiny 0.3% growth rate. or the second quarter's sluggish 1.9%. the third-quarter rate was robust.

The housing industry reflected some of this strength. Last October. U.S. housing starts jumped nearly 11% to an annual rate of 1.76 million. This is fairly close to the rate many analysts predict 1986 will achieve and was the highest rate since 1.93 million starts in April 1985.

INFLATION TO INCREASE. The third quarter's faster growth did not set off a new round of inflation. although most economists expect some increase. A factor in this inflation prediction is a declining dollar. Since last fall. when finance ministers of the U.K.. Fed. Rep. Germany. France. Japan and the U.S. agreed to try to push down the dollar. its value has declined slowly. A falling dollar will add to inflation's pace.

It will also boost U.S. exports. For some time. CEOs of paper companies have complained that the strong U.S. dollar has hurt them badly. First. it crippled exports of pulp and linerboard; second. it dampened domestic sales by making imports cheaper.

Eventually. a weaker dollar could help remedy this problem. But this is definitely not a situation where fast relief is in sight. "It will take another 20% to 25% decline in the value of the dollar before we are competitive in world pulp markets." admitted Mead Corp.'s chairman and CEO. Burnell R. Roberts. last October. He added that a "growing economy and weakening dollar will place the industry in a more profitable position."

"The next nine to 12 months will be critical in determining whether the [U.S.] paper industry enjoys relative prosperity in the second half of the 1980s or becomes bogged down by cost disadvantages and excessive capacity expansion outside the U.S.." suggested Gary Palmero. an industry analyst at Oppenheimer & Co. Inc.

DOLLAR MUST DROP. "The key variable is the degree of success in lowering the value of the dollar to make American industry more competitive internationally." Palmero said. "In any case. we would not anticipate any major near-term prosperity for domestic paper producers." He explained that even if the Group of Five manages to push the dollar down. it will take nearly a year to feel the effects. Meanwhile. "offshore producers

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Outlook '86 was prepared by Pulp & Paper's *news staffers Ted Blackman. Dave Allan. Debra Adams. and Will Mies* are likely to accept lower profit margins to hold market shares until their currencies appreciate to the point of financial pain, or until worldwide demand for paper and allied products is sufficient to require price rationing."

For the economy as a whole, the outlook is pretty good. Economists surveyed by *Blue Chip Economic Indicators* last fall on average looked for a 3.1% advance in real GNP in 1986 compared with an estimated 2.5% increase last year. The projected quarter-over-quarter rate of advance tapers off to around 2.7% in the second half of 1986—"not exactly a vigorous trend," according to editor Robert J. Eggert. Nevertheless, only a sixth of the 51 economists surveyed looked for a recession or the start of one in 1986.

HOW MUCH INFLATION? The Group of Five nations who intend to cheapen the dollar also plan to stoke up their national economies. Their most likely tactic will be a dose of easy money—meaning more inflation in all of these key countries. But a return to the high inflation of the late 1970s isn't likely, most analysts contend.

"The world economy is flooded with more products than can be readily absorbed," noted Edward Yardeni, chief economist at Prudential-Bache Securities Inc. "Too many goods are chasing too few customers," he added.

Clearly this is true in the paper industry, where overcapacity is a major problem in several key grades. Lumber faces the same problem; predicted strong housing activity in 1986 will not sop up the abundance.

The economists surveyed by *Blue Chip Economic Indicators* on average look for a 4.1% rise in prices this year (as measured by the GNP deflator) compared with a 3.7% rise in 1985—but probably not high enough to cause the Fed to tighten up on monetary supply growth very much. As a result, they see interest rates (as measured by three-month Treasury bills) remaining relatively flat at around 7.6% this year.

Some monetarists expect last year's rapid growth in money supply to turn up in a higher rate of inflation by late 1986. But E.F. Hutton's chief economist, Robert J. Barbera, sees "little risk of inflation accelerating anytime soon, despite recent big money-supply gains, and even if the dollar keeps dropping—as I expect it will."

HIGHER PAPER PRODUCTION. These economic trends should create a relatively favorable environment for the paper/forest products industry this year. Analysts surveyed by *Pulp & Paper* expect a solid improvement in operating profits for paper companies. Even greater increases are likely for wood products firms, though many of them are starting from much lower bases.

Most agreed that price increases will be modest—if they go through at all. "For the paper and paperboard industry to raise prices in 1986, there must be GNP growth of 4% for two consecutive quarters," said H.C. Bowen Smith of Salomon Brothers Inc. "If price increases do not become effective in the second quarter of 1986, it is likely that there will be no price increase at all."

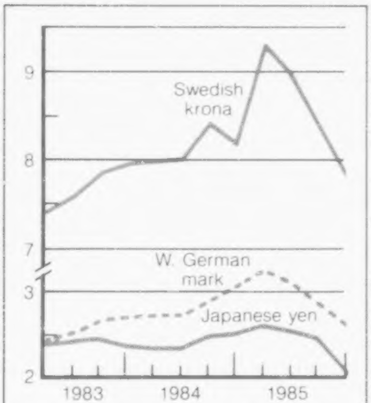
"The industry will have difficulty in raising prices," agreed Paine Webber Inc.'s Lawrence A. Ross. He predicted only modest cost increases, however, and a 20% to 30% rise in paper industry profits.

Operating rates to exceed 92%. The analysts *P&P* surveyed expect paper mills to run at about 92.6% this year; paperboard operating rates are forecast only slightly lower at 92.3%. These rates are up from late fall 1985 forecasts of 91.4% for paper and 90.8% for paperboard.

Within the main categories, estimated operating rates vary widely. Thomas Clephane and Jeanne Carroll of Morgan Stanley predict paperboard operating rates will range from 87.1% for recycled to 96.5% for corrugating medium. Kraft liner should run at about 92.6%.

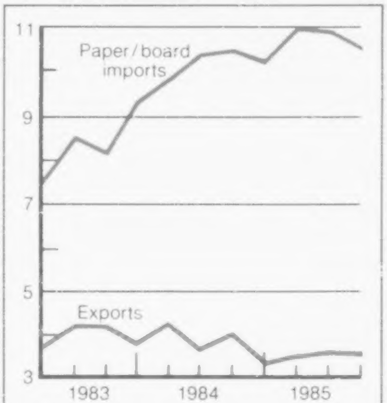
On the paper side, Clephane and Carroll expect coated free-sheet and groundwood mills to operate at 98.3%; other rates include 98.4% for newsprint, 88.4% for unbleached kraft, 92% for uncoated free sheet, and 87.3%

The rise of the dollar against other currencies...



▲ Foreign currency/dollars (yen expressed in 000s)

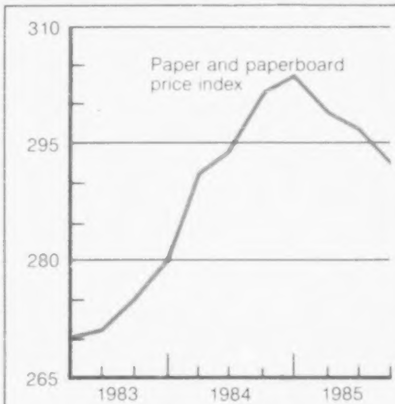
... hurt U.S. paper exports and attracted imports...



▲ Million short tons (quarterly shipment annualized)

Source: Commerce Dept.

... holding down prices in the U.S. market



▲ Producer price index (1967 = 100)

Source: BLS.

for uncoated groundwood.

Bruce Kirk of Goldman, Sachs & Co. predicted that combined operating rates for the paper/paperboard industry will average 94.2% this year. This is only slightly below the 94.7% rate in the third quarter of 1984, and significantly better than the industry's 88% combined rate in the second and third quarters of 1985.

Communication & Information Services' *Paper Industry Forecast* is more optimistic about paper prices and profits than other analysts. CIS predicts a strong recovery for the industry this year after the slump last year. Consumption of paper and paperboard will go up 4.6% from 1985 levels, while production rises 5%. Paper and board plants will operate at about 93.6%, CIS said.

Imports will continue to bother U.S. producers, especially imports of coated and uncoated papers, because of worldwide overcapacity and the dollar's relatively high value. As for exports, CIS said even a cheaper dollar won't make it much easier for U.S. paperboard mills to sell overseas.

Prices for commodity grades of paper and paperboard will improve significantly in 1986, CIS predicted.

Uncoated free-sheet producers face an unsettled market, according to Joseph V. Flaherty of Central National-Gottesman Inc. Domestic capacity is up, and producers in Europe and South America find the U.S. market attractive and intend to stay in it. In light of the oversupplied market, prices are apt to be quite competitive.

Coated groundwood, which has been in a boom condition for several years, may be facing a slowdown. Flaherty noted that supercalendered papers have become a permanent competitor to lightweight coated stock, and "order backlogs have softened, and it is apparent that the momentum [in coated groundwood shipments] has slowed down."

Market pulp is probably the industry's weakest grade, but there is some reason to expect higher prices. Mark Rogers of Dean Witter Reynolds Inc. believes "there is potential for a significant improvement in the way investors view market pulp prospects" in 1986. Rogers noted that labor contracts in British Columbia expire this spring: "another industry-wide work stoppage could do wonders for this product, as it did in 1984."

Rogers is equally optimistic about linerboard. Domestic demand seemed to be rising late last year, and inventories at box plants were quite low. The result will be "a surprisingly strong linerboard market as 1986 progresses, particularly compared with the highly depressed markets for most of 1985." He predicted that liner prices will rise from $290/ton currently to $350 by next fall.

PROFITS, CAPITAL SPENDING TO RISE. Although the industry will continue to face its share of problems this year, it should make more money than it did in 1985. Analysts' estimates of paper company earnings from continuing operations all showed increases.

The most conservative views suggested that earnings would go up about 15%; other estimates ranged from 20% to a whopping 76% increase. For wood products producers, 1986 should also bring better earnings. Estimates ranged from 5% to 45% higher than last year.

Paper companies' plans for capital spending are covered elsewhere in more detail (see p. 103). Analysts agreed that most of the money will be directed toward upgrades and conversions to produce different grades.

In nominal dollars, the industry's capital spending will rise this year, noted Paine Webber's Ross. "If you include mill conversions to other grades, more would be spent on capacity than on cost reduction. Returns are not high enough to justify new mills, but are high enough to encourage new machines in some grades, e.g., coated printing paper," he said.

Smith of Salomon Brothers expects "a rapid change in capital spending plans in both the paper and wood products industries from 1987 to 1990. We anticipate no greenfield additions—capacity increases will result primarily as companies integrate forward from market pulp.

"All other cash flow will be used for cost-reduction projects and quality improvement. On the bleached and unbleached side, customers will favor producers that can supply products by specifications rather than by basis weights and that can offer 24-hour delivery and increased service."

BRIGHT OUTLOOK FOR WOOD. For lumber and structural panel producers, the outlook is also fairly bright. U.S. housing starts have much to say about how well the wood industry will do, and the outlook is for starts to be at least as strong this year as they were in 1985.

Jaak Puusepp, vice president of Pemberton Houston Willoughby Inc. in Vancouver, B.C., sees a good year for the American economy—and a banner year for British Columbian sawmillers. He expects British Columbian sawmills to run at full capacity this year, helping supply lumber for 1.87 million U.S. housing starts. Other analysts *P&P* surveyed estimated that U.S. builders would start about 1.8 million units this year.

Because of this anticipated strength in housing, Puusepp predicted that U.S. softwood lumber consumption would rise from about 44 billion bd ft last year to 46.5 billion in 1986, a 5.7% increase. Canada will supply about 16.5 billion bd ft, 17.2% more than in 1985. Completing his rosy view for the lumber industry, Puusepp forecast a 16% increase in the average price for spruce-pine-fir lumber, to around $178/1,000 bd ft.

MAJOR POLITICAL ISSUES. U.S. fiscal and monetary policy is the industry's most important political problem, in the view of Salomon Brothers' Bowen Smith.

"The fiscal/monetary situation in the U.S. affects interest rates, which affect the dollar, which affects housing. Over the long term, U.S. timber supply will be af-

TABLE 1: **Analysts' projections for 1986.**

	Percentage change from 1985 levels (unless otherwise indicated)							
	Growth in real GNP	**Paper/board production**	**Operating rates[1]**		**Prices**	**Operating profits**		**Housing starts[2]**
			Paper	**Paperboard**		**Paper**	**Forest prod.**	
George Adler Smith Barney	+2.0%	+3.0%	92%	90.5%	+3-4%	+25-40%	+40%	1.7 mill
Bruce Kirk Goldman Sachs	+3.4	+6.6	94.2 (combined)		—	+39	+45	2.0
Evadna Lynn Merrill Lynch	+2.9	+2.9	91.4	90.5	+1.7	+14.4	+23.3	1.78
Mark Rogers Dean Witter	+3.5	+5.1	92.8	93.7	+8.7	+48	+34	1.8
Lawrence Ross Paine Webber	+3.2	+4.1	93.1	93.1	+3.4	+20-30	+25-35	1.8
H.C. Bowen Smith Salomon Brothers	+3.0	+3.0-3.5	92.9	91.5	+3-8	+15	+5	1.7-1.75
William Wigder First Boston	+2.0-3.0	+2.3	91-92	91-92	+5	+15	+30-75	1.75
Average	**+2.9**	**+3.9**	**92.6**	**92.1**	**+4.6**	**+26.9**	**32.7**	**1.8**

1. Production as percent of capacity. 2. Millions of units.

fected by changes in the tax law, which could eliminate capital gains treatment for companies and, at the same time, make it impossible for companies and individuals to expense forestry costs in the year they occur."

The fate of the tax reform bill is very much in doubt. By late November, the House Ways & Means Committee had agreed to retain tax breaks for small, individual tree farmers; corporations would lose them.

COATED PAPER

GETTING READY FOR TROUBLE

■ Coated paper mills should enjoy a fairly good demand in 1986, which is a good thing: with a dramatic capacity increase coming between mid-1986 and the end of the decade, the industry will need to gird for the coming battle. Pricing will be a problem this year and could be even more troublesome in the next two or three years.

Coated paper demand was strong in 1985 and should rise by about 4% in 1986, virtually the same pace as the planned capacity increases. However, most of the new capacity will be in coated groundwood (a 5.3% jump as opposed to a 1.9% increase for coated free sheet), and that area could have pricing problems through the year. Furthermore, the projected 5.3% coated groundwood capacity increase does not include the new 220,000-tpy Repap Enterprises Inc. machine starting up at Newcastle, N.B., in midyear.

If coated groundwood does face pricing pressures in 1986, it would not be anything new. In fact, to the surprise of most observers who expected the very tight market of 1984 to continue, the industry found itself with some excess capacity in 1985 despite the strong level of demand. Thus, as the year advanced, subtle forms of price relief were offered to customers, and by the summer it was clear that outright though modest discounts were being offered, mostly through merchants and brokers. And in December, some producers began offering discounts to contract customers, which brought the price down about 4% from the price those customers were already paying.

Imports and inventories. Two factors explain the industry's pricing problems in 1985: imports and inventories. Through last August, imports were up at an annual rate of 32% over the same period in 1984, although the rate of imports peaked in March. If the pattern of the first eight months continued through the year, 1985 imports would have reached as high as 526,000 short tons compared with 428,000 tons in 1984. The large majority of coated paper imports are groundwood.

The biggest single factors in the increase were Fed. Rep. Germany, Italy, and Finland, which between them represent well over half of all coated paper imports to the U.S. Traditional supplier Canada was shipping at a rate comparable to that of 1984.

Main reasons for the increases were the desire of U.S. printers and publishers to diversify their source of supply and, in some cases, to find a lower price. Both factors are expected to be less important in 1986.

The other cause of the weakening of groundwood prices in 1985 was the buildup of customer inventories beginning in late 1984. With availability a problem through most of that year, customers double-ordered whenever they could. They didn't realize they were making progress until their stocks were built up to impressive levels. Then when demand slowed down seasonally in the first quarter of 1985, stocks were excessive and customers began to trim.

That reduction continued throughout 1985 and is expected to last into 1986, although inventories in late 1985 were already getting to be fairly low again. But with two new LWC machines coming onstream in North America in mid-1986 and another 6.5% coated groundwood capacity increase expected in 1987—plus more in 1988 and beyond—customers were beginning to believe they wouldn't need heavy stocks for the next few years.

GROUNDWOOD OPERATING RATES. Of course the correctness of their decision depends on levels of demand. Through October the coated groundwood industry in the U.S. was running at almost a 92% operating rate, which is below the full-out conditions of the previous year, but which also doesn't leave much room for increases if the U.S. economy grows by more than the 2.5% to 2.75% rate that is generally expected.

In all probability the coated groundwood industry in 1986 won't run much better than 91% to 92%, which would make actual price increases somewhat difficult but not totally impossible in light of the expected decline in imports. The consensus in late-1985, however, was that the industry would begin to bring its price back by the fall of 1986 to where it had been in the fall of 1985.

Morgan Stanley & Co.'s analysts, Thomas Clephane and Jeanne Carroll, are more optimistic on operating rates, projecting a rise to 96% in 1986 from their estimate of 94.2% for 1985. They still feel prices will be difficult to increase, however. In fact, they wrote late in 1985 that they expect no coated paper price hike in 1986, referring to the "diminished likelihood of price increases in 1986 and 1987."

Coated paper's major markets should enjoy a good year in 1986 in terms of paper demand levels, but volumes won't be much above where they were in 1985. Irv Herschbein of Conde Nast Publications told a magazine publishing meeting last November that he expects his industry's performance in 1986 to be similar to its 1985 showing: "flat or slightly down."

A positive trend in one sector, Sunday magazines, could hurt mills' business in the traditional magazine sector. Some West Coast newspapers have begun to beef up their Sunday magazines with improved editorial packages and a swing to LWC, something that Herschbein listed as a possible threat to regional and city magazines in those areas.

Paper consumption by printers of inserts and flyers will continue to grow, although Paul Koessler, president of Greater Buffalo Press, believes that the recent 10%/year growth rate in insert printing is slowing down somewhat. This sector is important to both groundwood and free-sheet mills. And the catalog business, also important to both sectors, has reached a saturation point beyond which growth in paper demand will be slowed by the disappearance of uneconomic catalogs and the desire of catalog producers to control costs.

Indeed, all advertising- and promotion-driven printing will probably grow more slowly in 1986 than in recent years due to customer cost-containment efforts. And if advertisers perceive the U.S. economy heading into a recession in late 1986, many of them will pull in their horns even further.

Another factor that will affect both groundwood and free-sheet mills is the continuing desire of the customer for better appearance qualities in paper. Central National-Gottesman Inc.'s senior vice president, Joseph Flaherty, wrote recently, that "it is possible that we are entering a period of more selective catalog mailings which would reduce the quantity of paper used; but it is predicted there will be an increase in paper quality characteristics" at the same time.

HELPING FREE SHEET. The mills which would benefit from this would mostly be producers of Nos. 2, 3, and 4 roll offset, and all free-sheet grades except for some No. 4 groundwood. Scott Paper Co., which has achieved a big market success with No. 3 paper produced by its Skowhegan, Maine, mill, plans to start up a second 215,000-tpy machine at the facility in 1986. Recently a major merchant said the Skowhegan sheet was one of the few coated paper products still on allocation, and the company is expected to have no trouble selling out the production of the new machine when it starts up.

In general, coated free sheet should suffer less from overcapacity than coated groundwood although a surplus of coated groundwood could undermine pricing for Nos. 3 and 4 free sheet. Through October 1985, coated free-sheet mills were running almost a full point higher than coated groundwood mills in terms of operating rates, and that spread will continue through 1986. This will support prices for coated free-sheet, which have been firmer than groundwood quotes recently, although free-sheet mills would be taking a chance if they raised prices significantly in 1986 in the absence of a simultaneous groundwood hike.

Then in 1987, U.S. coated free-sheet capacity will rise by 8.6% while coated groundwood capacity goes up 6.5%—and unless the economy comes to the rescue, the entire coated paper industry will find its mettle tested.

UNCOATED FREE-SHEET

ANOTHER YEAR OF SLOW RECOVERY

■ Uncoated free-sheet mills in the U.S. will enjoy another excellent year in terms of shipments in 1986, and they may also note some improvements in prices. But with capacity increases heating up somewhat in 1987, 1986 may be remembered in retrospect as one of the best years of the decade.

That prediction depends heavily on the performance of the U.S. economy, but most observers feel North American producers will benefit from a small decline in the market share of imports. At the same time, consumption should grow by a little more than 4%, which—combined with a drop in imports—will help the U.S. industry to more or less keep up with a 4.4% increase in capacity.

Thus operating rates should remain on a level with 1985. Through October, U.S. uncoated free-sheet mills were operating at about 92% although Morgan Stanley & Co.'s analysts, Thomas Clephane and Jeanne Carroll, expect rates to run closer to 91% in 1985, 1986, and 1987.

Uncoated free-sheet turned in an uneven performance in 1985 in terms of its different end uses, with forms bond and copy paper shipments rising in the 3% to 4% range and shipments to commercial printers going up less than 2%. Customer inventories were very low through much of the year and then, when order backlogs jumped in the fall, customers began to worry about availability.

Order backlogs at some mills were running as much as six weeks in November, more than double that of most of the year. Even in the first three quarters of the year, the total number of orders received by the industry rose twice as fast as the 4% increase in shipments. And in the fourth quarter, customers actually had to shop around for paper to meet printing schedules.

RECOVERY IN PRICES. This, in turn, helped prices to bounce back from the summer doldrums, although by November quotes were still down by about 3% from year-earlier levels in the case of cut-size and roll offset. This, however, was a big improvement over earlier in the year: in the first quarter of 1985 roll offset prices were 25% below the first period of 1984, while cut-size quotes were running 16% behind year-earlier numbers.

Clephane and Carroll project an increase in average per-ton profits from the $65 level in 1985 to between $69 and $96 in 1986. Their assumption is based on a rise in a weighted average of prices of between 3.3% and 6.8% in 1986, compared with the 4.8% drop they estimate for 1985. They foresee prices returning to around where they were in 1984.

If prices rise dramatically in 1986—which is unlikely in light of the planned capacity increases—there is a real danger that imports will return with a vengeance. Central National-Gottesman Inc.'s senior vice president, Joseph Flaherty, wrote recently that there was concern "that overseas producers will have similar capacity problems" to those of the U.S.

With that possibility, Flaherty outlined a scenario in which some of the major overseas producers of uncoated free sheet try to minimize their troubles by exporting incremental tonnage to the U.S. And, he warns, this trend could have "the effect of one or two new paper machines imposed on an already oversupplied condition in the U.S."

Furthermore, an executive with a paper company noted, the U.S. market could become even more attractive to importers if U.S. prices climb too fast. In an article in the fourth-quarter edition of the *Central National-Gottesman Report*, however, Flaherty pointed out that "in an oversupply situation like the present, it is expected that U.S. producers will protect their traditional business and the imports will find the market to be very competitive."

CLOUDY LONG-TERM OUTLOOK. The long-term outlook for uncoated free-sheet is very cloudy indeed, if many of the possible capacity expansions take place. In addition to already-announced projects, companies considered to be candidates for new uncoated free-sheet machines by the early 1990s include Champion International Corp. (Quinnesec, Mich.), Boise Cascade Corp. (International Falls, Minn.), Great Northern Nekoosa Co. (at its Leaf River mill at New Augusta, Miss., or at Ashdown, Ark.), Hammermill Paper Co. (a second unit at its new Selma, Ala., mill), Union Camp Corp. (Eastover, S.C.), and Weyerhaeuser Co. (Columbus, Miss.). A Data Resources Inc. study published in 1984 is said to have listed another five specific machines as possible by 1995.

And a 250,000-ton expansion at Domtar Inc.'s Windsor, Que., mill, with new machines coming onstream in 1987 and 1989, is not included in the American Paper Institute's capacity figures. Domtar plans to sell the majority of the 350,000-tpy output of the mill in the U.S. and expects to become a much more established presence in the market than it has been. Overall, then, supply of paper in the late 1980s and 1990s will be adequate to fuel a very healthy expansion in demand.

But some of the long-term consumption numbers look impressive too. Hammermill executives told reporters in October that the U.S. copy paper market should rise from the 1.8-million-tpy level of late 1984 to a 2.5-million-tpy rate by the end of 1988. And they see the commercial printing market continuing to grow at a 3% to 4%/year rate over the long run.

The executives admitted that market prospects in the next few years are troubling. But looking at the prospect for substantial new capacity in the future, they expressed one cautiously optimistic belief: that forward integration of market pulp mills into white papers—which some observers fear could continue to destabilize uncoated free sheet for years to come—will not extend much beyond projects already announced or under serious study.

CUSTOMER INVENTORIES. In the meantime, prices are not high enough to fund another big round of capacity expansions. It is not likely that customers will build inventories as high in 1986 as they were in early 1984, and thus there will continue to be excess supply.

With substantial new capacity available to the market in the next few years, prices will probably not accelerate dramatically until the end of the decade—which could postpone any new round of capacity building beyond what has already been announced to the early-to-mid-1990s. The only joker in the deck, aside from the always-unpredictable U.S. economy, is the possibility that market pulp prices may fall so far that pulp mills feel forward integration is worth the tremendous risk.

BOXBOARD

OUTPUT TO RISE; PRICES TO TAKE LONGER

■ Demand for boxboard was off about 3% overall in 1985, but the most significant factor in the market was depressed prices. Volume is expected to increase slightly in 1986, but list prices could take longer to return to 1981 levels, industry observers indicated.

Industry analysts expect a modest recovery for boxboard in 1986. Thomas P. Clephane, of Morgan Stanley & Co. Inc., expects production of solid bleached board to rise 2.4% in 1986, while Rodney Young of Resource Information Systems Inc. forecasts a hike of 1.4% in 1986 and 9.4% in 1987. Clephane predicts recycled board output will be up 2.5% in 1986, while Young expects a slight decline of 0.9%.

TABLE 2: **Folding carton production (000 short tons).**

	1984	**1985**	**1986**	**1987**
Total production	**4,330**	**4,316**	**4,333**	**4,678**
Change (%)	5.9	−0.3	0.4	8.0
Bleached board	1,846	1,761	1,827	2,007
Share (%)	42.6	40.8	42.2	42.9
Clay-coated recyc.	1,572	1,591	1,547	1,652
Share (%)	36.3	36.9	35.7	35.3
Uncoated recycled	706	711	676	704
Share (%)	16.3	16.5	15.6	15.1
Unbleached kraft	207	254	283	315
Share (%)	4.8	5.9	6.5	6.7

Source: Resource Information Systems Inc.

TABLE 3: **Bleached board production by end use (000 short tons).**

Year	**Milk carton**	**Folding carton**	**Cup/ plate**	**Export**	**Other**	**Total**
1984	645	1,847	708	478	370	**4,048**
1985e	—	—	—	—	—	**3,925**
1986e	—	—	—	—	—	**4,020**
1987e	645	1,930	708	540	417	**4,240**

Source: Morgan Stanley & Co. Inc.

J. Rodney Edwards, American Paper Institute vice president, paperboard, forecasts that recycled board production in 1986 will be slightly above last year's output but will not quite reach the level of 1984.

In the folding carton market, observers generally expect clay-coated recycled board to perform better than SBS next year due to a sharp rise in bleached board capacity, according to API projections.

Recycled folding carton capacity should rise just 0.6% in 1986 and 1.6% by 1988, while SBS folding carton capacity will be up 11.5% in 1986 and 15.2% by 1988. This should keep the bleached board market soft at least through 1986, many observers indicated.

Westvaco Corp. alone is slated to start up a new 175,000-short-tpy SBS machine at its Covington, Va., mill in the first quarter of this year. One observer, however, expects this additional volume will not affect folding carton or milk carton markets. He said the tonnage is geared to the 0.008 to 0.014 basis weight range and should affect only current imports from Scandinavia for aseptic packaging.

LOW GRADES MAINTAIN CAPACITY. Although high grades of recycled board—tube and core stock, gypsum wallboard, test linerboard and recycled corrugating medium—have increased in capacity in recent years, plain chip and white vat capacity has actually shrunk, noted one observer. This should help firm up the lower grades in the coming months, he said.

He expects uncoated recycled board mills to operate at 89% to 91% capacity in 1986, but prices will probably not rise until wastepaper prices also increase. The two markets must move together for recycled mills to justify a hike to their customers, he said.

In the SBS market, an East Coast observer forecast improvement in 1986 on a tonnage basis, with folding carton up 6.9% and some improvement in cup and plate, but with the biggest increase to be in file folder. He said he expects a record SBS production in the first half of the year.

Another observer thought 1986 bleached board volume would be up from 1985 due to a slight growth in the economy, with milk carton rising by 2%; cup, 3%; plate, dish, and tray, 1.5%; and file folder, 3%. He also expects exports to improve as the dollar weakens.

Prices for clay-coated recycled board might start to rise as early as the first quarter if order backlogs—which were strong late in 1985—remain good after year-end mill maintenance and holiday shutdowns. SBS prices, however, will probably not rise until mid-year due to still unstable pricing late in 1985, some observers noted. Others, however, noted that bleached board backlogs late in 1986 were out several weeks in some cases.

UPHEAVAL IN MARKETING PRACTICES. Most industry observers felt 1985 was one of the worst years for boxboard and changed the way some grades were traditionally marketed. SBS, for instance, was no longer being sold on quality alone.

Depressed conditions in the boxboard industry began to surface late in 1984 and continued to worsen in the first half of 1985. The deterioration slowed somewhat by the third quarter and leveled off at year-end after a brief flurry of activity in September and October.

Through most of the year, pricing became more competitive, with discounting widespread and list levels off significantly in virtually all grades of boxboard.

The most substantial erosion, however, occurred in bleached board. SBS was hurt both by a drop in export demand as well as by depressed pulp markets. In addition, low wastepaper prices enabled clay-coated recycled board producers to compete more effectively in SBS markets, causing the loss of some bleached board market share.

By year-end, 20-pt clay-coated board in rolls was selling generally at $350 to 400/short ton compared with $375 to $425 in January, while 15-pt SBS in rolls was at $500 to $590 compared with $590 to $665/short ton at the beginning of 1985.

In comparison with other grades of recycled board, clay-coated folding boxboard did fairly well in 1985, said Edwards. Another observer, however, said conditions were weaker in certain areas. A West Coast observer reported that producers from other areas such as the Midwest, the U.S. South, and Mexico were shipping low-priced goods to the West, causing a decline of 10% to 30% in orders in that area. He saw no significant improvement in 1986. Another observer said SBS folding carton demand declined significantly in 1985, while cup stock and file folder were up. Tag stock and other bleached board also were down, he noted.

Solid unbleached sulfate paperboard remained the one strength in the boxboard market in 1985. Prices were generally stable throughout most of the year, and were even raised during the second half. SUS is expected to be the boxboard market's most significant growth area in the next few years, according to some analysts.

CONTAINERBOARD

RECOVERY LIKELY—BUT HOW STRONG?

■ Strengthening U.S. industrial production, the falling dollar, and limited capacity growth make some industry observers optimistic that containerboard will enjoy a strong pickup in 1986. This would be a welcome change from last year when many producers operated close to or below the breakeven level. Industry executives blamed the strong dollar as the main reason for last year's poor performance. The dollar's rise had the two-edged effect of depressing U.S. industrial production (to which corrugated box shipments are closely tied) and reducing linerboard export shipments.

THE DOLLAR'S DOUBLE WHAMMY. The inability of U.S. linerboard exporters to compete at price levels prevailing in overseas markets caused a backup of tonnage in the domestic market. Unbleached liner export shipments dropped from 2.1 million tons in 1983 to an estimated 1.6 to 1.7 million tons in 1985—a 400,000 to 500,000 ton drop.

Domestic demand was not strong enough to absorb the extra supply—since at the same time U.S. box plants were being hurt by the wave of imported merchandise packaged in boxes made overseas. Containerboard mill inventories climbed sharply, and producers began fighting for orders in the independent box market. The result was a dramatic slide in linerboard prices from the $350/ton level which briefly took hold in the fall of 1984 to $260 and lower by last summer.

The decline took prices down to about their level in the last recession, even though operating rates for linerboard mills last year averaged close to 90% vs 84% in 1982, analyst George B. Adler of Smith Barney has noted. Such price levels were unprofitable for all but the most efficient mills, although integrated producers were shielded somewhat by a less severe erosion in corrugated box prices.

Producers tried to raise containerboard prices by $30/ton last fall, but the hike was not initially successful. Still, the containerboard market began to show signs of tightening up late in the year due to some pickup in demand plus curtailments at a number of mills for a variety of reasons—market-related downtime, strikes, machine rebuilds, and an environmental dispute.

Inventories of containerboard at box plants and mills by Oct. 1, 1985 had dropped to 2.54 million tons from 2.89 million tons at the beginning of 1985 and from a peak level of 3.02 million tons reached on Apr. 1.

PRICE SURGE? "The powerful combination of a rising domestic demand and an exceedingly low inventory position at box plants will result in a surprisingly strong linerboard market as 1986 progresses, particularly compared with the highly depressed markets for most of 1985," according to Mark S. Rogers of Dean Witter Reynolds. He believes linerboard transaction prices will return to the current $290 list on Jan. 1, 1986 and further rise to $320/ton in the spring before regaining their prior peak level of $350/ton in the fall of 1986.

A similar price forecast is offered by Thomas P. Clephane and Jeanne K. Carroll of Morgan Stanley Inc., who see operating rates for liner mills rising to 92.6% in 1986 and those for corrugating medium mills to 96.4%. They project a 4.3% increase in linerboard production this year, helped by a nearly 11% increase in export shipments. Box shipments will rise about 3% in 1986 after about a 1% decline last year, they project.

NO NEW MACHINES. The latest American Paper Institute survey, which shows linerboard capacity rising only 1.6% over the 1986-88 period, is another reason some analysts are optimistic. Only one new machine has been announced for this period—the new 315,000-tpy multi-ply machine just beginning production at Chesapeake Corp.'s West Point, Va., mill. It will be partly offset by conversion of an existing liner machine to recycled medium.

Not included in these capacity figures, however, is the 175,000-tpy recycled liner mill Temple-Inland Inc. completed last fall in the Los Angeles, Calif., area. No additional semichemical or recycled medium machines are planned, and one 105,000-tpy machine at Manville Forest Products Corp. was recently shut down.

The threat of additional linerboard capacity from the conversion of kraft paper machines—threatened by plastic grocery sacks—has not materialized. Most of the machine conversions by International Paper Co., Georgia-Pacific Corp., and Champion International Corp. have been to white paper production. An exception is G-P's conversion of a swing machine at its Monticello, Miss., mill to 300,000-tpy of liner production—although some kraft paper will still be produced.

As for the stagnant kraft paper market, removal of some 700,000 tons of capacity over the 1984-86 period is helping to bring supply and demand into better balance, William M. Wigder of First Boston has noted. Prices rose $30/ton this fall on grocery bag and sack paper grades and a further increase was possible in December.

But capacity creep? Not all analysts, however, are convinced that the containerboard market will show a substantial pickup next year. Evadna S. Lynn of Merrill Lynch believes that industry capacity growth will be higher than expected due to incremental expansion from cost-reduction projects—such as installation of new high-pressure presses and secondary fiber lines.

She also believes that linerboard capacity throughout the world was being added at almost twice the 1.5% annual rate of expansion in the U.S. "Thus, a weaker dollar may not bring back exports to customers who have become increasingly self-sufficient or who are being wooed by nontraditional suppliers to world markets."

U.S. linerboard mill operating rates will only advance to 92.3% in 1986—below the "magic" 95% level at which producers have the most success implementing price increases, according to Lynn. She believes that as a result linerboard prices will rise to the $290 to $300 range this spring and to $320 next fall.

But even the more pessimistic forecasts represent a big improvement for the industry over 1985.

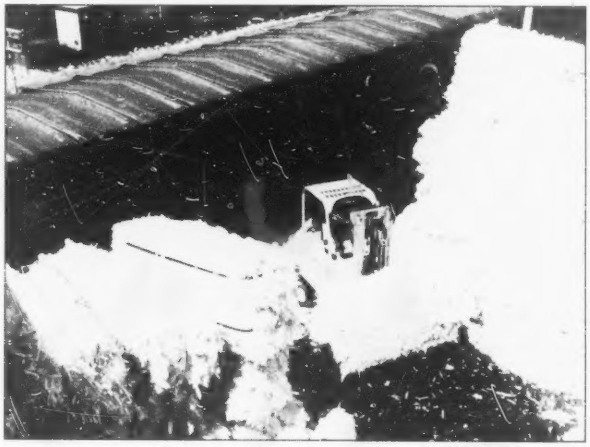
WASTEPAPER

EXPORT DEMAND TO IMPROVE

■ Wastepaper consumption fell off substantially in the U.S. in 1985 after a robust recovery in the previous year. Export demand, however, managed to hold up the market until late summer, when it also began to erode.

With exports—the one bright spot in an otherwise lackluster market—failing by the fourth quarter, many observers were calling 1985 one of the worst years for the secondary fiber business and thought it would take at least until mid-1986 for the market to fully recover. An upward trend, however, could begin as early as the first quarter, they noted.

Domestic consumption was off 4.4% for the first eight months of 1985 compared with that of a year earlier, according to American Paper Institute figures. Exports for the first three quarters, however, were still 2.0% ahead of the same period a year earlier. By September, though, overseas demand was slipping, off 23.5% from August's total.



Despite poor demand, the market would not have been as severely depressed in 1985 were it not for prices also being down sharply from 1984 levels. Most grades were off by 50% or more, with the lower grades down the most. The low grades fell sharply in the first quarter and then declined slowly during the next two quarters. The high grades started falling gradually in the second quarter and continued slipping late in the year.

Export prices were also down substantially. According to one observer, the decline in prices in shipments to Taiwan from August 1984 to August 1985 was as follows: news, − 21%; deinking, corrugated, − 14%; − 23%; pulp substitutes, − 27%; and all other grades, − 11%.

PRICES STABILIZE BY YEAR-END. Prices on the domestic market, however, appeared to have leveled off by year-end. The low grades were thought to be about as low as they could get, and an expected revival in the export market later in the year was keeping pulp substitutes and deinking prices steady. In addition, reduced cut-up at converting facilities due to normal year-end slowdowns was helping to control higher grade supplies.

Observers were somewhat optimistic about the outlook for 1986, expecting improvement beginning early in the year based on a projected pickup in the overall paper industry, as well as in U.S. and worldwide economies.

Several capacity expansions for grades using fiber from old corrugated containers were expected to come onstream in late 1985 or early 1986. This, together with increased demand for export of OCC, could cause "tightening in the supply situation," said J. Rodney Edwards, American Paper Institute vice president, paperboard.

One midwestern dealer expects OCC and new double-lined kraft corrugated clippings to improve first, beginning in the first quarter. This will be followed by a pickup in news, boxboard cuttings, and mixed papers. Much of this will be going for export, he said.

Exports to remain robust. Most observers were certain that export markets for paperstock would be active in 1986 and beyond. Computer printout is expected to be one of the key grades to grow as a result of expanded export demand. Increased lazer content in CPO, however, will cause some overseas buyers in time to switch to comparable grades such as hard white shavings or envelope cuttings, or ledger for those mills having deinking systems, noted one West Coast broker.

OCC and news should also remain popular export items—although the outlook for news is less certain due to plentiful supplies. Inventories of OCC, however, appeared to be diminishing late in 1985 due to increased demand. Exporters—particularly those from the East Coast—had increased shipments to overseas customers as they became concerned about rising freight rates off the West Coast. This could lead to a shortage early in 1986, noted Edwards.

Consumption of U.S. wastepaper in overseas countries is expected to rise in 1986. Expansions to recycling capacities—especially in the Asian countries—are slated next year. In addition, many foreign countries have attained their highest possible recycling capabilities for mixed papers, news, and OCC, said Edwards.

One observer noted the U.S. paperstock market will be increasingly influenced by overseas mills as they become more and more dependent upon U.S. secondary fiber—generally of higher quality than that found in other countries. He felt the U.S. recovery rate should reach 30% late in the 1980s, mainly due to rising exports.

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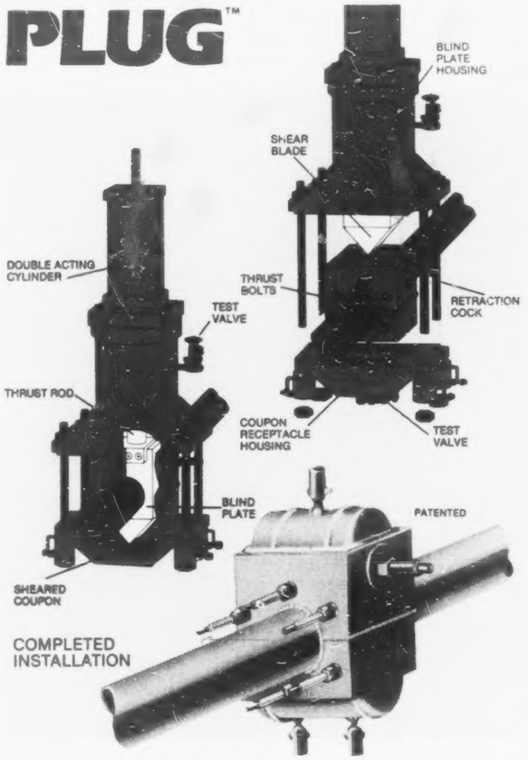

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DECENT OPERATING RATES AND SLOW FIRMING OF PRICES PREDICTED FOR 1986

Canadian pulp and paper mills kept their employees fairly busy in 1986, although they had to cut prices to do it. Despite price weakness in all the industry's major export products, eastern Canadian mills boosted profits. Meanwhile, British Columbian firms were generally back in the black after some bad years in the early 1980s, although one or two were still mired in red ink.

Mills that did best in 1985 were generally those with heavy newsprint, uncoated groundwood, or tissue involvement. Companies dependent on pulp sales for the majority of their revenues turned in poor performances, even losing large amounts of money in a few cases.

Some of that may change in 1986—and not for the better. Analyst Brian Topp of Midland Doherty Ltd. recommends investors sell virtually all eastern newsprint stocks. That doesn't mean Topp believes newsprint is currently unprofitable—indeed, he thinks the average Canadian newsprint mill today makes C$120/metric ton on sales in the U.S., about on a par with U.S. mills. But he expects to see earnings decline by 10% to 20% in 1986. And he thinks the industry is in for tough times in the next five years, with decent profit levels not returning until the early 1990s.

Despite the problems faced by Canadian paper mills—with overcapacity heading the list—there are some reasons for optimism. Topp assumes that the political clout of Canada's big exporting industries will result in a Canadian dollar of US$0.70 or lower in the next few years, which will give pulp and paper mills a profit hedge for a few years. However, the difficult newsprint markets he sees for the next few years mean newsprint mills won't be able to capitalize on the weak currency. He also worries about the concommitant possibility of protectionism in the U.S.

STRONGER CANADIAN DOLLAR. In its outlook for the Canadian economy, however, the Conference Board of Canada assumes that the country's currency will "hover around the US$0.73 mark until 1988, appreciating by a half a cent per year thereafter."

The reason for the Conference Board's projection is that it assumes the present differential between U.S. and Canadian interest rates will narrow over the next few years. The group believes Canada's prime rate will drop by just under 130 basis points over the next year and then bounce back up by 110 basis points by the end of 1990.

While Canadian interest rates are moving closer to those of the U.S., Canada's economic growth will continue to track the U.S. performance. The Conference Board expects Canada's gross national product to rise by about 2.5% in 1986 and 1987, with growth dropping to around 1.5% in 1988-90. This follows a 4.1% rise in 1985. On the other hand, the Columbia Business School's index of leading indicators for Canada, developed for the U.S. Conference Board, shows a rise of 5%/year for Canada, compared with a 4% showing by the index six months ago. The Conference Board's interpretation of the index for Canada is "expansion continuing." By contrast, the index for the U.S. shows a 1% growth rate, identical to the estimate of six months ago.

Canada's inflation rate should remain low until late in the decade. The Conference Board projects an increase in the Consumer Price Index of just 3.3% in 1986 and 1987, rising to 4.7% in 1989.

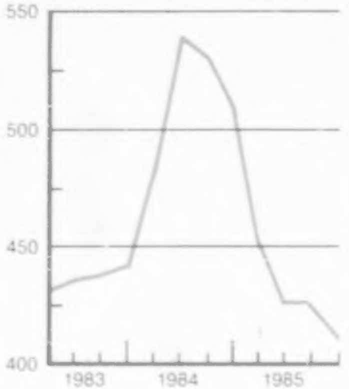
Government policy in the next year is expected to be restrictive, following the government's announcement last May of tax increases and a spirit of restraint in federal spending. That spirit will restrain consumer spending and overall economic activity as well. Real disposable income is projected to rise just 0.6% in 1986, following a 4.2% jump in 1985.

Unemployment is expected to remain troublesome—it will still be almost 9.5% in 1987, down modestly from the 10.7% of 1985—which means that political pressures on the government to aid troubled pulp and paper mills will not abate. Through 1987 Canadian employers are expected to increase their work forces by 2.5%/year, but for the two years after that employment should rise by just 1%/year. Thus, any fall in unemployment depends on greater-than-predicted economic expansion.

High unemployment could make life a little easier for the industry in one sense, however: with a 13% jobless rate in British Columbia—where Canadian labor negotiations are focused in 1986—unions in that western province are expected to be more concerned about job security than about wage hikes or extra days off. Pay increases could be the most moderate in years. Perhaps the most significant change considered possible is the delinking of forestry talks from paper mill negotiations.

IMPORTANT U.S. CUSTOMERS. It is the paradox of Canadian business that the fate of the country's biggest industries is tied more to developments in the U.S. than to those in Canada. The biggest single factor affecting the profits of Canadian mills is the level of U.S. demand

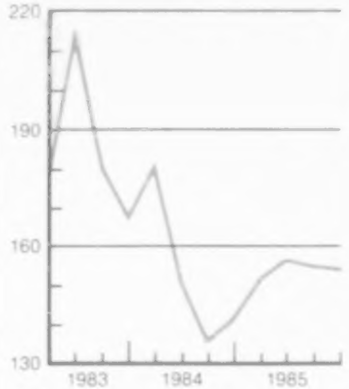
The downturn in market pulp prices...



▲ Price for northern bleached kraft pulp delivered in U.S. ($/metric ton)

Source: *P& P Week*

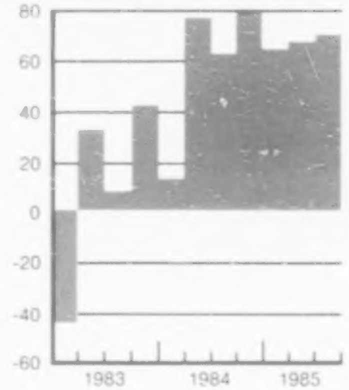
... plus continued weakening in lumber prices...



▲ Canadian spruce/pine/fir lumber in U.S. ($/000 bd ft)

Source: *Random Lengths*

... have hurt profits of Canadian mills



▲ Profits of six major companies: Abitibi, BCFP, Canfor, Con-Bath, Domtar, MacBlo (C$ millions)

for market pulp, newsprint, and uncoated groundwood paper; overseas demand for pulp and newsprint are also of crucial importance.

In market pulp, Canadian mills will find that the oversupply that plagued markets in 1985 is continuing this year. Growth in market pulp consumption will probably not be strong enough to absorb all of the new capacity brought onstream during the 1984-85 period. This will mean that producers in Canada will continue to take periodic downtime to keep inventories under control and prevent further erosion in prices. The recent decline of the dollar should help, however, by reducing much of the cost advantage of Scandinavian competitors. Increased hardwood supplies (eucalyptus) from countries like Portugal, Brazil, and South Africa will keep pulp markets competitive.

Prospects for Canadian newsprint mills are not bad, if a 92% operating rate is any indicator. On the other hand, prices are weak and not likely to head up during first-half 1986. Mills will consider themselves lucky to have set the stage this year for real price increases in 1987. And Canadian mills continue to have trouble overseas, suffering a major loss of market share in Europe and experiencing the same dramatically low prices in the Far East that have bothered mills from other areas.

Uncoated groundwood will not match newsprint in terms of operating rates, but supplies are more in balance with demand and prices are not under as much pressure as they are in the newsprint market. Nevertheless, uncoated groundwood mills have suffered from the ready availability of LWC and will continue to be hurt by competition from LWC if the U.S. economy does not turn in a very healthy performance.

NEWSPRINT

DEMAND STEADY, PRICES WEAK

■ Nothing will come easily for North American newsprint producers in 1986, but if the industry gets enough breaks it should be able to raise prices once during the year. This depends on so many lucky developments, however, that the majority of executives are not optimistic. They also worry about how low the average price will drop before recovery sets in.

U.S. mills will enjoy a modest increase in operating rates in 1986, to a projected 95.5% of capacity from an estimated 94.1% in 1985. Canadian mill operating rates will change very little, dropping to 91.7% from 92.0%.

For both countries, however, those modest-to-good operating rates mask a soft market which is likely to get softer as the year goes on, at least until the autumn months. For mills selling to the U.S. market, the problem is not volume, but prices.

With the North American industry running at better than 92% capacity through most of 1985, executives could point to a market that was in rough balance. For example, one marketing chief noted that North American mills produced about 1.127 million metric tons in September 1985. Imports added 25,000 tons, for a total of 1.152 million tons. But, he estimated, total demand on North American production in that month was 1.164 million tons.

While the industry has certainly enjoyed a strong two years (1984 and 1985) in terms of production, that same executive estimates that the three biggest Canadian companies—Abitibi-Price Inc., CIP Inc., and Consolidated-Bathurst Inc.—took 97% of the announced downtime in Canada during the first ten months of the year. Thus, the other companies were enjoying full-out operating conditions at the expense of their big competitors. Such a situation could not be expected to last long.

Indeed, that imbalance was reflected in a steady weakening of prices throughout the year. As 1985 got under way, prices east of the Rockies were arguably below $500/metric ton on average ($535 was average list). By end-1985 it was nearly impossible to guess at an average price, with quotes available below $400 from a very few suppliers—notably South Africa's Mondi Paper Co. Ltd., in the case of Rupert Murdoch's *New York Post*.

Large buyers were probably getting discounts of 10% or more from most suppliers and were certainly being offered deals that directly or indirectly brought the price down below $450 in some cases.

West of the Rockies, prices started the year at $535/metric ton, less 5% for customers taking contracted amounts, or an effective list of $508.25; volume discounts were subtracted from the $508.25. By the end of the year mills had announced reductions in the effective list of a further 5% for contract customers.

EXCESS CAPACITY. The key factor in this progressive erosion of prices throughout the U.S. was the fact that North American capacity in 1985 was about 1.1 million tons higher than demand on that capacity. This gap is expected to remain largely unchanged in 1986—although capacity will show little increase—and, until pared by increased demand or permanent shutdowns, will continue to act as a depressant on prices.

On top of that, imports, at about 300,000 tons, are expected to remain unchanged in 1986. Overall U.S. demand is expected to increase only 1.5% while Canadian demand grows just 2.4%. Unfortunately, North American exports are not likely to increase in 1986 either. At most, then, 1986 will be a year in which the industry will set the stage for price recovery in 1987. (Interestingly, Magnus Diesen of Jaakko Pöyry Oy at *Pulp & Paper's* Second Uncoated Groundwood Papers Conference held in New York in November 1985, said that he expects to see North American newsprint consumption rise by just 400,000 tons between 1984 and 1990—to 12.9 million tons from 12.5 million tons. He concluded that "newsprint demand and supply are likely to be roughly in balance during the second half of the 1980s" unless new capacity expansions upset the balance.)

TABLE 4: **North American newsprint supply/demand balance (000 metric tons).**

	1985e	**1990f**
North American consumption	12,700	14,100
North American shipments overseas	1,630	1,700
Imports from overseas	300	300
Total demand*	**14,030**	**15,500**

e = Estimate. f = Forecast.
*Total demand = North American consumption + North American shipments overseas — Imports from overseas.

TABLE 5: **North American newsprint capacity (000 metric tons).**

	Canada	**U.S.**	**Total**
1985	9,835	5,020[1]	**14,855**
1987	10,100	5,125	**15,225**

1. Effective capacity
Source: Presentation by David Wilson of Canadian Pulp & Paper Assn. to newspaper industry forum in Dallas, Texas, October 1985.

While 1986 is likely to be a year of very gradual firming, it will have its difficult moments. Advertising expenditures during the year are expected to show little growth. The first quarter in particular should prove very weak from paper producers' point of view. While North American mills were producing at a good rate in the fourth quarter, they were doing so by cutting prices. Going into the seasonally weak first period, it seems unlikely that mills will be able to reduce prices enough to avoid substantial downtime.

One of the problems mills will face in the first quarter is the high level of customer and mill inventories. Customers, for example, had 1.526 million tons of inventory on hand at the end of September, or 44 days of supply at current rates of consumption. With capacity in excess and price deals readily available, publishers are likely to slash inventory in the first quarter—which means mill operating rates will suffer.

PRICE HIKE "DOOMED." Brian Topp, an analyst at Toronto-based Midland Doherty Ltd., believes, however, that "Canadian industry giants will once again insist on announcing another newsprint price increase for Apr. 1," a hike that he describes as "doomed to fail." In his view, the likely oversupply of paper "should preclude any U.S. price increase until late in 1986 or even early 1987." Topp also feels the Canadian dollar may undergo a de facto devaluation in the coming year, which would undermine Canadian mills' argument of the financial necessity of a price increase.

But some analysts imagine a scenario in which the U.S. dollar drops far enough against European currencies to cut the ground from under importers. That, in turn, begins to help the U.S. economy, spurring advertising and hence, paper demand. By the second half of the year, then, demand is growing at a 3% to 5% rate. Strengthening demand, plus the financial pain felt by mills in the first half due to continued discounting, begins to shift the balance of power from publishers to mills. Sometime between July and October average prices start to rise, setting the stage for strong price improvements in 1987.

The possibility of a price increase by October 1986 is a real one, but the above scenario ignores several facts. A demand increase of 3%—double the projected rate—would absorb only about 350,000 tons of unused capacity—a far cry from the existing oversupply. Further, this kind of expansion in the economy is beyond that projected by the large majority of economists (which is not, in itself, an argument against the scenario).

The most optimistic scenario, however, ignores developments in lightweight coated (LWC) paper and supercalendered uncoated groundwood, where capacity increases in North America and Europe are likely to create a severe oversupply in 1987 and 1988, enabling customers—such as the commercial printers who use a substantial share of North America's newsprint capacity—to upgrade their paper use. Any optimistic scenario for newsprint which is not accompanied by significant newsprint capacity shutdowns in the next few years is simply voodoo forecasting.

UNCOATED GROUNDWOOD

SOLID, UNSPECTACULAR GROWTH SEEN

■ Uncoated groundwood mills in North America suffered from the increased availability of coated paper in 1985 as advertisers continued to prefer the highest possible quality in four-color reproduction. With the economy still growing and uncoated groundwood capacity not rising rapidly yet, 1986 should see an improvement in operating rates for much of the year—although 1986 might also be remembered as the calm before the storm.

If uncoated paper mills suffer when coated paper supplies are loose, it is worrisome to consider the effect of a jump of 24% between 1985 and 1988 in North American coated groundwood capacity. This is the magnitude of the increase forecast by Robert L. Johnson in his remarks before *Pulp & Paper*'s Second Uncoated Groundwood Papers Conference in New York in November 1985. (Johnson was referring to a study he made as an independent consultant before joining Abitibi-Price Sales Corp. as senior vice president of marketing.)

And this was on top of a 70% rise in North American supercalendered (SC) paper capacity projected by Johnson for the same period. Clearly the rough balance that is expected for the market in 1986 will not last forever.

Some observers noted that Finnish companies are working to develop a product which one analyst calls a "coated No. 6," falling between No. 5 and SC in both quality and price. Such a product would clearly complicate the marketing task of uncoated groundwood and LWC producers trying to sell new capacity.

There could be mitigating circumstances, however. Magnus Diesen of Jaakko Pöyry Oy told the Uncoated Groundwood Conference that "the low consumption level [of SC] in North America certainly includes some potential for growth." He expects North American demand for SC to rise from about 600,000 metric tons in 1984 to 900,000 metric tons in 1990—a period in which machine-finished (MF) uncoated groundwood consumption will actually drop modestly. He also noted that projections of a coming oversupply of coated paper could be flawed, as were similar forecasts in the early 1980s.

Whatever happens in the late 1980s, conditions won't be all that bad in 1986. By one executive's estimate, North American uncoated groundwood paper mills will run at 89% of capacity in 1986, up from 87% in 1985. He believes North American shipments will rise by about 6% in 1986 after the 3% drop in 1985. His 1986 projection is more optimistic than many, but it seems likely that demand will at least return to 1984 levels.

SUNDAY MAGAZINE REVIVAL. Strong areas for uncoated groundwood will include inserts plus a possible revival in the recently moribund Sunday magazine business. Both SC and MF mills will enjoy healthy years in their insert business, although advertising expenditures in general are expected to grow slowly this year. And as Paul Koessler, president of Greater Buffalo Press, said at the Uncoated Groundwood Conference, the recent 10%/year growth rate in inserts "is beginning to level off a little because retailers are getting more sophisticated at segmenting their runs."

The recent move of several newspapers in California to upgrade the paper quality and sharpen the image of their Sunday magazines could spread to other regions this year. While these publications have opted for coated groundwood in their magazines—something that other publishers will do as well—many newspapers are expected simply to upgrade within the uncoated spectrum.

For example, Sunday magazines that have been printed on newsprint or standard rotonews may go up to premium rotonews, supercalendered rotonews, or clay-filled SC. Whether this will benefit or hurt the uncoated groundwood industry as a whole remains to be seen.

FERMENT IN DIRECTORY PAPER. This will also be an exciting year in directory paper. As Robert Kaiser, manager of paper, printing, and distribution for BellSouth National Publishing, told the Uncoated Groundwood Conference, the former Bell telephone companies are developing a number of new directory products as well as invading each other's territories and modifying existing products. BellSouth, along with others, is testing lighter-weight papers, and Kaiser feels 20-lb (24 × 36 basis) paper will soon be the standard for white directory sections instead of 22.5-lb paper. Because of the move to lighter sheets, Kaiser also feels flexographic printing may catch on some years down the road.

Even with the innovation among the phone companies, however, Kaiser feels paper consumption among the former Bell companies will only grow at a rate of 2% to 3%/year from the present 375,000-short-ton level for the next one to three years. But the independents, using about 175,000 tpy of groundwood papers currently, are where the real growth in paper consumption lies.

In mid-1986 Reuben H. Donnelley Corp. will begin competing in the Pennsylvania telephone directory market, using 25,000 or 30,000 tons of paper and helping the independent sector to a growth rate of perhaps 20% for a year or so. After that Kaiser expects the independents to settle down to a percentage growth rate in the "high single-digit or low double-digit range."

MODEST CAPACITY GROWTH. In addition to some exciting prospects in the end-use area, the industry can look forward to a year in which capacity will not rise faster than demand. API expects a net reduction in U.S. capacity of 19,000 tons, while the Canadian Pulp & Paper Assn. projects an increase in Canadian capacity of 116,000 short tons. The result will be a 3.5% increase in official North American capacity figures.

But there will also be shifts within the uncoated groundwood spectrum. By late 1985 or early 1986, Abitibi-Price Inc. was expected to begin making unfilled SC on the 45,000-tpy No. 6 machine at its Kenogami mill in Jonquière, Que. By 1988, Abitibi will be making a total of 155,000 tpy of clay-filled SC offset. By early 1987, CIP Inc. will add about 35,000 tpy of unfilled SC capacity at its Trois Rivières, Que., mill. Robert Johnson also listed Consolidated-Bathurst Inc. among those companies expected to be adding significantly to SC capacity by 1988. And one West Coast company is studying an upgrade to produce unfilled SC.

Meanwhile, two big LWC machines will come onstream around mid-1986 in North America, making any improvement in LWC prices somewhat problematic. It is unlikely that uncoated groundwood prices will rise in the absence of any LWC hike, so producers will probably spend 1986 trying to firm up prices to where they were at the start of 1985. Anything more depends on a stronger performance by the U.S. economy than most expect.

MARKET PULP

ANOTHER DIFFICULT YEAR

■ Barring another major labor disruption in British Columbia, 1986 will be another difficult year for North American market pulp producers, with only modest improvement likely in prices. But the intermediate-run outlook becomes brighter due to an absence of major expansion projects until 1990 and the integration of some U.S. market pulp capacity into white paper production.

Chemical paper-grade market pulp demand in 1985 was reasonably healthy, with North American and Scandinavian shipments up close to 1%. Another small increase is possible this year. "Growth in the large U.S. and western European markets is projected to plateau at 1984 levels through 1986," Fred G. Robertson, president of Mead Pulp Sales Inc. told security analysis last fall. "Demand is predicted to increase modestly in Japan, China, and other Far Eastern markets, but not enough to offset the projected increases in capacity."

The additional capacity has been coming from the startup of eight major new market pulp mills over the 1984-85 period with almost 1.8 million metric tons of capacity. Included are three mills in the U.S. and one each in Finland, Guatemala, Austria, Portugal, and South Africa, Robertson noted. In addition, two large mills have recently begun production in Czechoslovakia, with part of their shipments targeted for western Europe.

The world practical maximum chemical paper-grade market pulp capacity has risen from 24.2 million tons (excluding eastern Europe and China) at the end of 1983 to 25.8 million tons by 1985, according to American Paper Institute data. API has estimated that the practical maximum capacity ratio of 92% in 1983 and 1984 will drop to 90% in 1985 and 89% in 1986, Robertson said.

PRICE PRESSURE. Except for a surge in the first half of 1984, the oversupply has kept pulp prices under pressure. The benchmark price of northern bleached softwood kraft (NBSK) delivered in Europe showed only modest improvement through 1983 from the low reached in the 1982 recession of around $410/metric ton. The price then climbed sharply in the first half of 1984 to $540/metric ton during the two-month British Columbian labor dispute.

Since then the trend in prices has been mostly downhill, with the dollar price in Europe falling to about $390/metric ton in the second quarter of 1985 and staying around that level. Under the EEC pulp price-fixing settlement in 1984, North American mills must sell at least half of the pulp they sell in Europe in local currencies. For a while, this edict had the unintended effect of improving realizations of North American pulp suppliers as the dollar began to drop. But producers were not able to hold local currency price levels in the oversupplied market—and recently deutsche mark, franc, and lire prices have tended to equal the dollar price.

The downward price trend has been similar in North America, with the list price for NBSK dropping to $425 last August. Prices in the Far East showed some modest improvement during the summer months from more deeply depressed levels but then gave way again in the fall. Most industry observers believe that prices in the fourth quarter were scraping along the bottom since, as one agent put it, "if they went any lower, someone would crack."

GROWTH OF EUCALYPTUS. One positive effect of the decline of the U.S. and Canadian dollars against the currencies of most industrialized countries is that it has reduced the cost advantage held by Scandinavian producers. Most Swedish and Finnish market pulp mills are now believed to be close to or below the break-even level and this should increase their willingness to take downtime and fight for higher prices.

The problem is that now about 37% of the world pulp supply comes from outside the Norscan region. Producers in countries like Brazil, Portugal, Spain, South Africa, and Chile in many cases still have a significant cost advantage due to weak currencies. And as a rule, these producers seldom take downtime since they must earn foreign exchange, provide jobs, etc. Much of this new production is eucalyptus pulp, which has grown from 400,000 tons in 1976 to an estimated 2.8 million tons in 1985, according to Ross Hay-Roe of *PaperTree Letter*. Such pulp has become well accepted in Europe and has begun entering North America in growing quantities.

MORE DOWNTIME. Norscan producers are expected to take more downtime around December and early spring to keep pulp inventories close to or below the 1.5-million-ton level. The downtime plus some restocking of low customer inventories in anticipation of British Columbian labor negotiations this summer may give producers an opportunity to raise prices in the second quarter. But as Midland Doherty's analyst Brian Topp noted, "Even if prices recover to $425 to $450/metric ton, average prices for 1986 are unlikely to change from 1985 levels for Canadian mills."

The real improvement in market pulp prices will probably begin in 1987—if there isn't a recession—as supply and demand finally come into better balance. U.S. market pulp capacity will begin to decline due to new white paper machines being installed at market pulp mills owned by companies such as Georgia-Pacific and Hammermill. No major market pulp expansions are planned in other parts of the world until 1990 when Aracruz Cellulose and other Brazilian producers may embark on another major round of expansion. ■

LABOR

FOCUS ON BRITISH COLUMBIA, U.S. SOUTH

British Columbia will again be the focus for labor negotiations in the Canadian pulp and paper industry in 1986. Not only will the province hold the greatest concentration of Canadian mills with contracts expiring in 1986, but the practice of joint-industry bargaining might be ended there after nearly three decades.

In the U.S., approximately 144 mills will be negotiating new labor agreements in 1986 (see table p. 66). The South leads the other regions in bargaining activity this year, having 59 mills with contracts expiring in 1986. The Midwest has 44; the East, 21; New England, 11; and the West Coast, 9 contracts.

Reducing labor costs and increasing productivity will be the basic concerns of the industry as labor and management meet at the bargaining table this year, in both Canada and the U.S.

Richard P. Klinzing, vice president of employee relations for the American Paper Institute, expects that U.S. companies will be seeking to increase operator and maintenance flexibility, eliminate holiday production restrictions, and continue restraints in wage increases and health care costs.

WAGE SETTLEMENTS DECLINE AGAIN. In 1985, the overall average wage settlement for all regions of the U.S. was a 2.6% increase compared with 3.3% a year earlier. New England averaged 2.6% in 1985 compared with 4.9% in 1984; the East, 3.3% vs 4.3%; the Midwest, 3.6% vs 4.6%; the South, 3.3% vs 5.3%, and the West Coast was down 1.1% vs down 0.9%.

In addition to moderating wage rates in recent years, U.S. mills have also reduced the number of strikes annually. For 1985, there were only eight walkouts compared with 15 in 1984.

The effect of individual strikes has been lessened also. In recent years, more companies have been operating mills with supervisory staff while unionized employees are walking the picket lines. This not only has enabled mills to maintain orders and defray costs, but has also undercut labor's power at the bargaining table.

Since the early part of this decade, the paper industry has begun to reduce its labor costs through modernization, more flexible policies in operating mills and using manpower, and reduced employee pay and benefits.

Julian Kien of Kien Associates Inc., New York, N.Y., asserts that since 1960 the pulp and paper industry's average hourly earnings have increased three times as rapidly as those of U.S. manufacturing overall.

"Increasingly, as companies seek to be competitive in a worldwide marketplace, cost reductions in labor, as well as in energy, raw materials, etc., is essential," explained Kien.

Kien expects individual company bargaining to produce a range of variations aimed at reducing labor costs. "1986 looks like a heavy bargaining year, with potential for some new and different results emerging from what appears to be a new era of bargaining," said Kien.

WAGES STILL CHIEF ISSUE. Wayne E. Glenn, president of the United Paperworkers International Union, expects wages to be the number one issue in 1986 in the U.S. It's unlikely, though, that the increases will be higher than in 1985, he said, noting that continued competition from worldwide producers is likely to "cut into the number of jobs in the U.S. paper industry."

"This, in turn, will make it difficult for our union

TABLE 6: **Major contracts by region on 1986 U.S. paper industry bargaining calendar.**

Company	Mill location	Union	No. of employees	Contract expires
Southern region				
Allied Paper	Jackson, Ala	U	421	8/1
Augusta News	Augusta, Ga	U	259	7/28
Bowater	Catawba, S.C	U	721	10/30
Brunswick	Brunswick, Ga	U	748	7/31
Buckeye	Foley, Fla	U	777	3/14
Champion	Courtland, Ala	U	1,170	6/15
Champion	Houston, Texas	U	442	12/31
Champion	Lufkin, Texas	U,A,B	858	6/30
Champion	Pasadena, Texas	U	1,057	5/30
Champion	Roanoke Rapids, N.C	U	474	8/31
Container Corp	Fernandina Beach, Fla	U,A,B	587	5/31
Federal	Richmond, Va	U,O	124	11/30
Federal	Riegelwood, N.C	U	1,186	9/8
Georgia Kraft	Macon, Ga	U,A,B	462	8/27
Georgia Kraft	Mahrt, Ala	U	300	10/31
Georgia Kraft	Rome, Ga	U,A,B,O	580	8/27
Georgia-Pacific	Palatka, Fla	U,A,B	1,319	5/31
Georgia-Pacific	Pryor, Okla	U	113	8/15
Gilman Paper	St. Marys, Ga	A,B,U	791	6/6
Great Southern	Cedar Springs, Ga	U,B	660	9/30
Gulf States	Demopolis, Ala	U	394	1/6
Hammermill	Selma, Ala	U, (B, exp. 7/5)	310	3/5
Inland Container	New Johnsonville, Tenn	U	145	10/31
Intl. Paper	Bastrop, La	U,B	934	2/1
Intl. Paper	Georgetown, S.C	U,A,B	693	5/31
Intl. Paper	Pineville, La	U	227	10/10
Interstate Paper	Riceboro, Ga	U	214	10/26
James River	Naheola, Ala	U,B	1,380	10/31
Jefferson Smurfit	Jacksonville, Fla	U,B	267	6/30
Kimberly-Clark	Coosa Pines, Ala	U,A,B,O	1,163	9/14
Kimberly-Clark	Memphis, Tenn	U	1,043	7/31
Manville	West Monroe, La	U	686	6/30
Mobile	Mobile, Ala	U	120	9/2
Nekoosa Papers	Ashdown, Ark	U	1,045	11/1
Owens-Illinois	Valdosta, Ga	U,B	356	9/15
Potlatch	McGehee, Ark	U	242	7/31
Rock-Tenn	Dallas, Texas	U	163	1/31
Scott	Mobile, Ala	U,B	2,664	5/31
Stone Container	Florence, S.C	U	443	10/31
Stone Container	Hodge, La	U	575	6/30
Stone Container	Pt. Wentworth, Ga	U,A,B,O	327	6/19
Temple-Eastex	Evadale, Texas	U,B	840	7/31
Union Camp	Montgomery, Ala	U	486	10/31
Union Camp	Savannah, Ga	U,A,B,O	1,363	5/31
Westvaco	Covington, Va	U (B, exp 3/1/87)	1,008	11/30
Westvaco	Luke, Md	U (B, exp 3/1/87)	1,374	11/30
Westvaco	Wickliffe, Ky	U	343	7/1
Weyerhaeuser	New Bern, N.C	U	362	12/19
Weyerhaeuser	Pine Bluff, Ark	U	157	8/17
Weyerhaeuser	Plymouth, N.C	U,O,B	1,434	7/31
Weyerhaeuser	Valliant, Okla	U	304	11/19
Willamette	Campti, La	U	203	11/15
Willamette	Hawesville, Ky	U	440	8/31

Legend: U = United Paperworkers International Union; W = Assn. of Western Pulp & Paper Workers; A = International Assn. of Machinists & Aerospace Workers; B = International Brotherhood of Electrical Workers; O = Others.

Source: American Paper Institute Employee Relations Dept

Company	Mill location	Union	No. of employees	Contract expires
Eastern region				
Champion	Deferiet, N.Y	U,O,A	705	5/1
Champion	York, Pa	U	19[illegible]	9/22
Container Corp	Philadelphia, Pa	U	294	6/19
Crown Z	S. Glen Falls, N.Y	U	285	10/1
Finch, Pruyn	Glens Falls, N.Y	U,A,B,O	366	6/15
Georgia-Pacific	Reading, Pa	U	88	8/1
Hammermill	Erie, Pa	U	1,226	6/10
Hammermill	Oswego, N.Y	U,A,B,O	140	8/1
Packaging Corp	Plattsburgh, N.Y	U	132	8/1
Penntech	Johnsonburg, Pa	U	565	4/10
Potsdam Paper	Potsdam, N.Y	U	110	3/1
Simpson Paper	Miquon, Pa	U	236	2/14
Sonoco	Downingtown, Pa	U	111	2/24
Midwest region				
Appleton Papers	Combined Locks, Wis	U	510	6/30
Appleton Papers	W. Carrollton, Ohio	U	295	9/1
Blandin Paper	Grand Rapids, Minn	O	976	7/1
Champion	Hamilton, Ohio	U	1,453	9/14
Champion	Sartell, Minn	U	424	6/1
Container Corp	Circleville, Ohio	U,O	97	6/19
Container Corp	Wabash, Ind	U	217	6/19
Crown Z	Baltimore, Ohio	U	84	9/26
Dunn Paper	Port Huron, Mich	U	192	6/1
FSC Paper	Alsip, Ill	U	108	10/28
P.H. Glatfelter	Neenah, Wis	U	363	8/1
Hammermill	Kaukauna, Wis	U	1,261	7/31
James River	Green Bay, Wis	U	923	4/30
James River	Parchment, Mich	U	1,093	7/23
Jefferson Smurfit	Lockland, Ohio	U	230	11/1
Keyes Fibre	Hammond, Ind	U	191	6/16
Manistique	Manistique, Mich	U	155	6/15
Mead	Escanaba, Mich	U,B	1,110	5/31
Mead	Otsego, Mich	O	192	6/1
Menominee	Menominee, Mich	U	274	4/30
Packaging Corp	Filer City, Mich	U	295	5/11
Packaging Corp	Rittman, Ohio	U	263	5/1
Plainwell Paper	Plainwell, Mich	U	311	11/30
Pentair	Detroit, Mich	U	189	4/30
Pentair	Port Huron, Mich	U	215	7/31
Potlatch	Brainerd, Minn	U	576	6/15
Potlatch	Cloquet, Minn	U,O	894	6/15
Procter & G	Cheboygan, Mich	U	330	9/25
Procter & G	Green Bay, Wis	U	1,400	4/31
Scott	Muskegon, Mich	U	744	6/15
Shawano Paper	Shawano, Wis	U	180	5/5
Union Camp	Monroe, Mich	U	120	7/20
Weyerhaeuser	Rothschild, Wis	U	395	6/1
Wisconsin Tissue	Menasha, Wis	U	696	6/30
New England region				
Boise Cascade	Rumford, Maine	U	1,355	6/30
Millers Falls	Millers Falls, Maine	U	100	7/30
Monadnock	Bennington, N.H	U	115	9/1
Sonoco	Holyoke, Mass	U	105	6/26
Strathmore	Turners Falls, Mass	U	94	6/30
	Woronoco/Westfield, Mass	U	413	6/30
Pacific Coast region				
Container Corp	Los Angeles, Calif	U	111	6/1
Container Corp	Santa Clara, Calif	O	103	6/16
Crown Z	Camas, Wash	W	1,889	5/31
Garden State	Pomona, Calif	U	108	4/30
Louisiana-Pacific	Antioch, Calif	W	298	8/14
Port Townsend	Port Townsend, Wash	W	402	5/31

members to negotiate the wages and benefit increases they need to maintain a decent standard of living," said Glenn.

Kien said that the U.S. paper industry in 1986 will continue to negotiate contracts based on product line rather than on geographic location. Another factor that is likely to affect bargaining is the consolidation of the industry through mergers, takeovers, and other ownership changes.

According to an industry labor relations executive at a large paper company, industry leaders are likely to begin to examine more closely such expenses as premiums paid for working unusual shifts, such as Sunday work and wire time and unusual positions in the mill.

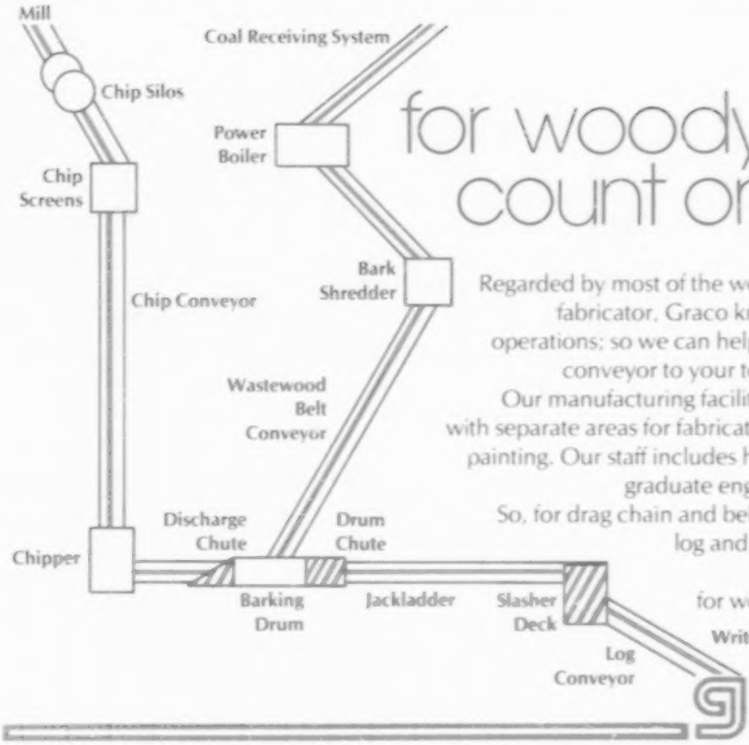
CANADIANS WANT JOB SECURITY. While wages may still be a major concern to U.S. unions, unemployment and job security are expected to be the key bargaining issues in the British Columbian industry, according to Donald A. Saunders, chairman and CEO for Forest Industrial Relations Ltd. and the Pulp & Paper Industrial Relations Bureau.

FIR and the PPIRB have acted as bargaining agents for the forestry and primary sectors of the industry for the past three decades, but that could change this year as a result of negotiations between industry and unions on possibly breaking up or modifying in some way the practice of joint industry bargaining.

With unemployment in British Columbia at more than 13% late last year, workers are likely to be more concerned with keeping their jobs than in improving them, observers indicated. The Conference Board of Canada indicated last fall that it expected pulp and paper to be among the industries settling at the "lower end of the scale" of pay increases, which are projected to average 3.8% this year.

In the current three-year contract which expires on June 30, wages in the British Columbian industry were frozen in the first year and increased 4% to 4.5% in the last two years. Since the last contract, though, the industry has not been able to recoup the losses incurred when the market turned down in 1981. This is likely to leave the union negotiators without much leverage in talks this year.

"Two years ago, the British Columbian industry lost a billion (Canadian) dollars before taxes and we still have not recovered from that financial blow," said Saunders. He explained that the industry is in heavy financial debt and requires even more capital to invest in needed modernization to enable it to remain competitive.



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ROOFING INDUSTRY UPHEAVAL STILL ON, AND NO REBOUND IS EXPECTED SOON

While it is considered a superior product, fiberglass mat has undercut profits in the roofing industry proportionate to its share of the market

By DEBRA A. ADAMS, Senior News Editor

The infiltration of fiberglass mat into the roofing industry in less than a decade has inadvertently caused significant overcapacity that has sent that market into a tailspin and caused an upheaval that is expected to continue for some time. Restructuring on a grand scale has been accomplished in just a few short years, but it will take more shutdowns to bring the industry back into shape, observers indicate.

While generally viewed as a superior product, by both the manufacturer and the consumer, fiberglass shingles have not been kind to industry profits. As more and more capacity has been converted over from organic felt, and new facilities have come online since the late 1970s, prices have continued to decline, forcing more plants to close in an effort to firm the market.

At least 25 fabrication plants have closed within the past decade, according to industry analyst Jonathan Goldfarb, of Merrill Lynch. Yet capacity has not been reduced significantly because converting to fiberglass mat results in substantial increases in capacity due to better running times and other benefits.

Industry observers say that as much as 90% of market share now belongs to fiberglass. That compares with just 5% in 1979, according to Goldfarb, who puts the current estimate at "over 75%."

The stampede to switch to fiberglass appears to have been a nearsighted decision, and companies apparently did not consider its far-reaching effects. Fiberglass became more popular with consumers in the 1970s because of its longer life (25 years vs 20 years for paper-based shingles) and higher fire retardant capabilities. For the manufacturer, fiberglass cut production costs because it required less asphalt and other materials and increased machine speed, raising output greatly.

Organic mat must first be saturated with one type of asphalt, then coated (sealed) with another type. Fiberglass mat does not require saturation, which is a time-consuming process, it requires only sealing. Production lines, therefore, can run 30% to 35% faster with fiberglass mat than with organic felt, Goldfarb estimated.

The frenetic switch to fiberglass shingles might have had far less disastrous effects on industry margins had it come when the housing industry was booming, but in the early 1980s, construction activity slowed down.

The industry has not maintained the 1978 peak of 2.30 million new housing starts and is not expected to do so for the rest of the 1980s (Table 1). Instead, housing starts began dropping in 1979 and have been as low as 1.06 million units in 1982, according to Dept. of Commerce figures. At the lowest point, some roofing facilities ran at less than 40% of capacity, observers said.

SHINGLE SHIPMENTS IMPROVING. Strip shingle shipments suffered proportionately, falling to 54.77 million squares in 1981, improving to 72.51 million squares in 1983 and 74.96 million squares in 1984, according to Dept. of Commerce statistics (see table).

Since 1982, building activity has been stepped up somewhat, with housing starts in 1984 reaching 1.750 million units. For 1985, however, the National Assn. of Home Builders, Washington, D.C., forecasted housing starts would drop to 1.650 million units and would fall again to 1.550 million units this year. Goldfarb, however, felt housing activity would reach 1.75 million units in 1985 and would remain flat this year.

As the market eroded in the face of falling demand and rising capacity, more and more facilities were closed indefinitely or permanently, and many were sold. Ownership changed hands more frequently as the market fell further. And although the past two years have seen

TABLE 1: **Roofing industry market indicators.**

Year	Strip shingle shipments (000 squares)	New housing starts (000 units)	Wastepaper consumed* (000 short tons)
1978	75,960	2,023	1,793
1979	76,630	1,749	1,794
1980	59,900	1,292	1,543
1981	54,770	1,084	1,342
1982	57,570	1,062	1,055
1983	72,510	1,703	1,126
1984	74,960	1,750	1,124
1985e	—	1,650-1,750	1,136
1986e	—	1,550-1,750	1,190
1987e	—	—	1,190

*Represents total construction paper and board consumption of wastepaper. e = Estimate.
Sources: Dept. of Commerce and American Paper Institute.

some improvement, the transition is far from over.

As recently as early last year, Bird Inc. sold off all but one of its roofing facilities to Genstar Corp. This included two roofing felt mills in Shreveport, La., and Charleston, S.C., as well as five converting plants. Bird kept its northeastern facilities, though. Two of those mills—in Phillipsdale, R.I., and Norwood, Mass.—were closed, dismantled, and the land sold. However, a third fiberglass shingle converting operation was opened early in 1985 in East Walpole, Mass., at a cost of $12 million.

In the deal with Genstar, Bird also retained the right to sell products from its former facilities under its own brand name. In addition to these products it will also sell services, adding to the value of the transactions.

More companies have been selling higher-quality products or additional services with their goods in an effort to raise margins that have suffered significantly from low roofing prices in recent years. Goldfarb notes the "market acceptance in recent years of roofing products which are upgraded with respect to textures, depth and dimension, color patterns, laminated construction, and so forth. Those products are generally costlier and more profitable than traditional lines."

But no matter how successful marketing efforts are, it will remain a buyer's market as long as supply exceeds demand. Industry observers generally agree that the single most critical problem in the industry is overcapacity. "The overcapacity situation since 1979 has put this industry in the position where the only survivors are the low-cost producers," said one marketing executive. "The ones that are consolidating or merging are positioning themselves better in the marketplace."

INDUSTRY RESTRUCTURING. As a result of the transaction with Bird, Genstar doubled its capacity and positioned itself among the top three roofing producers, with GAF Corp. and Owens-Corning Fiberglas Corp.

Genstar now owns five primary mills, with three organic felt mills in Portland, Ore. (35 short tpd), Cornell, Wis. (193 tpd), and Shreveport, La. (235 tpd), and two others in Ennis, Texas, and Charleston, S.C., making fiberglass shingles. It also owns 11 converting operations.

Most major roofing manufacturers, however, have switched over from producing organic felt to producing primarily fiberglass. Celotex Corp., which manufactured paper-based shingles for most of its history, is now 90% fiberglass, the company said.

In 1984, GAF stepped up plans to convert all of its facilities to fiberglass, and it completed the transition during that year. In January 1985, it once again announced a $22.8-million proposal to upgrade its roofing operations, focusing on the Fontana, Calif., fiberglass facility.

Owens-Corning, one of the pioneer manufacturers of fiberglass roofing, is 100% fiberglass. Included in its facilities are organic felt mills that have been acquired and converted. O-C has aggressively invested in fiberglass, even when the roofing market has been distressed.

At a time when most roofing manufacturers have put their major capital improvement plans on hold, Owens-Corning on June 28, 1985, opened up a wet process glass fiber facility in Fort Smith, Ark. In May it completed a new line to double capacity at its Morehead City, N.C., single-ply roofing plant.

A number of its mills were acquired from Lloyd A. Fry Roofing Co. in 1977. Since then, Owens-Corning has shut down or converted all 14 primary and 24 secondary facilities from organic products to fiberglass materials. Presently, the company operates four primary mills in Aiken, S.C., Barrington, N.J., Kansas City, Mo., and Fort Smith, Ark., as well as 18 facilities converting glass fiber mat into residential and commercial roofing materials. Commercial products include roll roofing for single-ply and built-up applications, the company said.

During the past seven years, Owens-Corning has closed or changed the product line at ten secondary roofing plants, closed two primary mills, and halted primary roofing production at the Mishawaka, Ind., mill, which continues to print shingle wrappers. In addition, organic dry felt production at some facilities with primary and secondary operations was discontinued, and the sites now only convert fiberglass roofing materials.

FTC GETS INVOLVED. Four of Owens-Corning's roofing facilities on the West Coast have been on the block since July 1982, when the Federal Trade Commission ruled that they gave the company an unfair competitive advantage in that region. In a recent ruling, the FTC said that O-C had to sell two of these facilities. O-C is appealing the ruling. A newly formed Detroit, Mich.-based company called U.S. Roofing Corp. has bid on the plants.

The sites include two felt mills with converting facilities in Compton, Calif. (75 tpd), and Portland, Ore. (60 tpd), and two converting operations in Woodscross, Utah, and San Leandro, Calif., which have been idled since 1980. The two felt mills in Compton and Portland were also shut down in 1980, although converting operations at the two sites have continued to produce fiberglass shingles. O-C phased out all of its felt operations since 1980, the company said.

"As the change to a glass fiber shingle and investment in capital equipment have extended Owens-Corning's productive capacity, the company has consolidated production into fewer facilities," said Bert E. Elliott, vice president of Owens-Corning's roofing products operating division. "Several other companies have also adjusted to the changes," he said.

Georgia-Pacific Corp. is one of the few larger roofing manufacturers which has not converted to fiberglass mat to any extent. The company's four primary mills in Ardmore (17,000 tpy) and Pryor (30,000 tpy) Okla., Daingerfield, Texas (15,000 tpy), and Franklin, Ohio (52,000 tpy) all make paper-based felt, which is converted into shingles, roll roofing, and saturated felt at its six plants, the company said.

Surprisingly, G-P got into the organic shingle business just as profits began to turn down and fiberglass conversion took off. In 1978, it acquired its first roofing mill in Franklin from Hoerner Waldorf Corp. The following year it built a converting operation there. In 1981, it bought the Daingerfield and Ardmore mills from Big Chief Roofing Co. and purchased the Pryor mill from CertainTeed Corp. The final purchase occurred in 1983 with the acquisition of the Denver, Colo., converting operation from GAF.

During the past few years, a number of manufacturers have idled or permanently shut down facilities in an effort to firm the market. It is not known precisely how many facilities may eventually be restarted, although one estimate is that about 25 of the 105 roofing plants in operation in 1979 that have been shut down are not likely to restart.

CertainTeed closed two of its ten roofing facilities in September 1981, in Kansas City, Mo., and York, Pa. (which included an 85-tpd felt mill). The York facility was reopened in 1983, but in August 1984 it was idled permanently along with four other facilities in Chicago Heights, Ill., Dallas, Texas, Richmond, Calif., and Tacoma, Wash. Converting plants in Avery, Ohio, and Oxford, N.C., and felt mills in Savannah, Ga. (80 tpd), and Shakopee, Minn. (200 tpd), were kept open.

MANY FACILITIES CLOSED. In September 1981, GAF closed its felt mill (120 tpd) and converting operation in Kansas City, Mo., as well as a plant in Denver, Colo., due to a rapid rise in the cost of asphalt used in roofing and a severe decline in product demand, the company said. In August 1984, it closed its South Bound Brook, N.J., operation and mothballed felt mills and converting operations in Gloucester, N.J. (335 tpd), and Joliet, Ill. (280 tpd). In November 1984, however, the Joliet and Denver sites were sold to Genstar, which planned to renovate and reopen the facilities.

Congoleum Corp. in recent years permanently closed its 100-tpd roofing felt mill in Finksburg, Md., due to high energy costs and the increasing dominance of fiberglass shingles in the marketplace, the company said. The converting operation in Finksburg, however, remained open and continues to convert 4,000 rolls a day.

Surprisingly, the situation in Canada is quite different. Canadians appear to be in no rush to convert to fiberglass. According to one marketing executive, the cost of importing the fiberglass—not widely produced in Canada—makes it more feasible to manufacture organic shingles. In addition, the advantages of fiberglass roofing are not as compelling to the Canadian consumer as to the U.S customer.

"From a marketing/sales point of view, glass shingles have better performance than organic in blistering and curling, but poor performance regarding blow-off and cold weather handling," noted a Domtar executive. "The fire characteristics of both products vs wood shingles or shakes is not important in Canada," he added.

Domtar claims to have a 27% share of the Canadian residential roofing market, with one 80-tpd roofing felt mill in Thorold, Ont., and four converting plants, in Lachine, Que., Brantford, Ont., Lloydminster, Alta., and Burnaby, B.C., the company said.

CANADIAN MARKET DIFFERENT. Like the U.S., Canada's roofing industry has been in a state of transition in the 1980s. In 1983 and 1984, "severe disturbances" in the marketplace occurred, according to one industry observer. Prices and profits have been depressed, and roofing industry overcapacity is most severe in western Canada, a marketing executive said.

The outlook in eastern Canada is somewhat brighter, with improvement expected in the near term due to heavy reroofing demand. Profits and return on investment, though, will remain inadequate, according to a close observer. In addition, more felt mills are expected to close as even Canada feels the demise of the market for organic felts.

The remainder of the 1980s is expected to be competitive, both in Canada and the U.S. Overcapacity and a strong U.S. dollar have caused some eastern Canadian producers to infiltrate the northeastern U.S. market, causing prices there to deteriorate even further.

Prices since 1980 have remained relatively flat, with some producers reporting slight improvement while others are experiencing their lowest levels in five years. The Bureau of Labor Statistics price index for prepared asphalt roofing indicates a decline of about 18% between early 1980 and early 1983.

Prices improved somewhat during the latter part of 1983 and early 1984 but started to erode again late in the year. That deterioration continued in the first half of 1985, with levels off 1% to 2%. Likewise, production was off an estimated 6% to 8% in the first half of last year, and by year-end that could rise to a 10% decline for 1985 overall, observers feel.

Wastepaper demand is likely to decline somewhat with the drop in paper-based roofing production, although by how much is uncertain because no exact figures are kept on use of paperstock in roofing. The American Paper Institute reports that of the 1.126 million short tons of secondary fiber consumed in U.S. construction paper and board mills in 1983, 8.9% was mixed papers, 20.9% newspapers, 30.0% corrugated, 9.0% pulp substitutes, and 1.2% was high-grade deinking.

Observers generally feel the shakeout in the industry will continue for at least another year. Many roofing facilities are expected to shut down, however, before the market can resume its balance. Goldfarb estimates industry capacity is between 10% and 20% too high. "An outside observer could suspect that some large producers might decide to essentially 'write off' the current cycle in hopes of strengthening the overall supply/demand balance for the long term," he noted. ■

CAPITAL SPENDING SURVEY: 1985-87

North American industry spending stays high as competition fuels modernization drive and mills boost capacity in more profitable grades

By CARL ESPE, News Editor

Despite generally poor market conditions in 1985, pulp and paper industry capital spending for the year looks destined to set new records in both the U.S. and Canada. But while money for capital improvements will continue to flow in the U.S., Canadian companies may be ready to tighten the purse strings, according to *Pulp & Paper*'s annual survey of capital spending plans.

P&P's latest survey covers spending plans for the three-year period from 1985 to 1987 and beyond. The results show planned expenditures in the U.S. of $8.56 billion for the three-year period, up 4.0% from $8.23 billion in last year's survey. In Canada, however, spending plans total only C$4.10 billion for the period, down 10.2% from the $4.57 billion reported last year.

Record spending in 1985. U.S. papermakers planned to spend a record $8.21 billion on capital projects in 1985, up 13.9% from the 1984 total of $7.21 billion, according to a Commerce Dept. survey conducted in July and August. Those results indicate a healthy year for capital spending overall, but the news is not all good: the survey also found that the spending increase would taper off as the year progressed. The completion of several major projects after midyear was responsible for part of that decline, but the lower numbers probably also reflect concern about the economy. After adjustment for inflation, real spending was up 16.0% in the first quarter of 1985 and 15.6% in the second, but the Commerce Dept. expected spending to run 11.4% above 1984 in the third quarter and only 7.5% in the fourth.

Canadian paper and allied product companies got more bullish about 1985 capital spending as the year progressed, according to Statistics Canada. When last surveyed, Canadian papermakers reported plans to spend C$1.90 billion in 1985, up 61.6% compared with 1984. That figure represents a 16.5% increase over companies' intentions at the beginning of the year and, if it holds up, will break the old record of $1.86 billion spent in 1982.

Higher U.S. spending in 1986? Bucking the trend in many other industries, U.S. pulp and paper companies plan to boost spending for plant and equipment to a new high of $8.58 billion in 1986, according to McGraw-Hill's annual fall survey of capital spending plans. That would constitute a 9.7% jump over 1985 outlays, which McGraw-Hill estimates will total $7.82 billion.

Among the industries surveyed, the paper industry's planned increase for 1986 is second only to an 18.0% jump for the rubber and plastics sector. Overall, however, U.S. business investment is expected to decline 1.0% in 1986—a bit of a shock, according to McGraw-Hill, because spending usually declines only during or immediately after a recession.

One factor in higher paper industry spending plans may be the long lead time required for major projects, which tends to lock in spending. Another may be the

TEN-YEAR CAPITAL SPENDING TRENDS

YEAR	U.S. TOTAL		CANADA TOTAL	
1985	$8,210	13.9%	$1,629	38.7%
1984	7,210	21.8	1,174	17.5
1983	5,920	−0.8	999	−29.7
1982	5,970	−11.2	1,420	−15.3
1981	6,720	−1.2	1,676	61.0
1980	6,800	22.5	1,041	51.9
1979	5,550	39.1	685	33.6
1978	3,990	10.8	513	−1.6
1977	3,600	15.8	521	6.4
1976	3,110	4.4	490	22.6

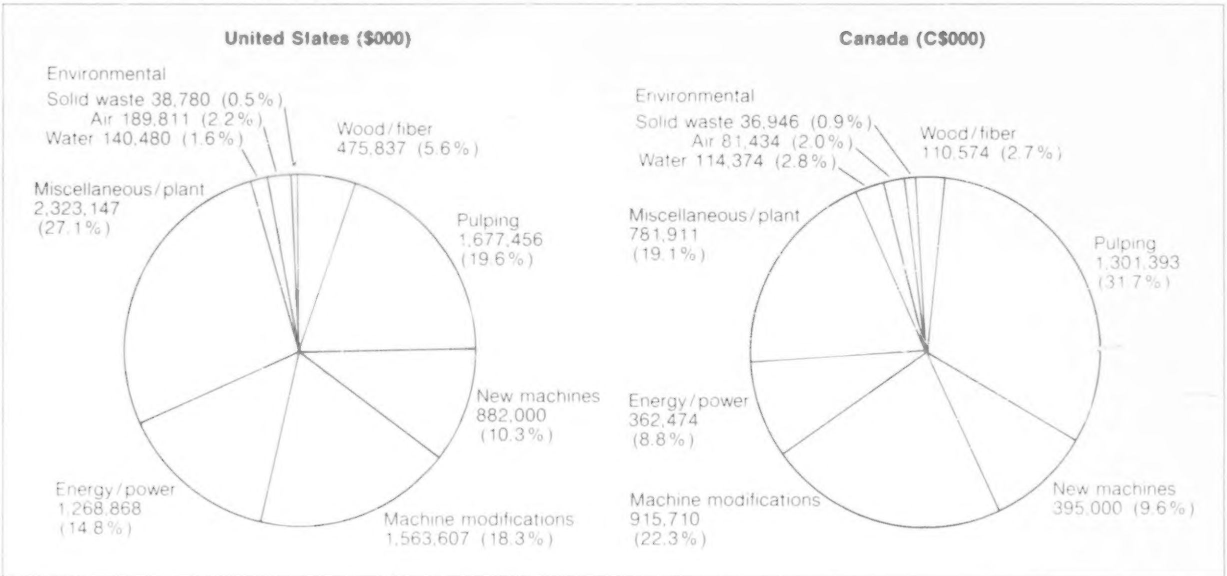
Source: Commerce Dept.; McGraw-Hill Economics; Statistics Canada.

TEN-YEAR U.S. ENVIRONMENTAL SPENDING TRENDS

YEAR	AIR		WATER		SOLID WASTE	
1985	$160	−1.8%	$ 58	−31.8%	$ 34	−20.9%
1984	163	10.1	85	−44.8	43	−54.7
1983	148	55.8	154	25.2	95	30.1
1982	95	−42.4	123	−3.9	73	1,116.7
1981	165	−18.3	128	−29.7	6	−89.9
1980	202	6.9	182	23.8	59	−25.3
1979	189	27.7	147	−0.7	79	1,875.0
1978	148	−20.0	148	−31.5	4	−92.3
1977	185	−25.4	216	−46.5	52	−55.6
1976	248	−37.7	404	72.6	117	1,200.0

1. Environmental spending totals are not available for Canada.
Source: Commerce Dept.; McGraw-Hill Economics; Statistics Canada.

FIGURE 1: **Reported spending by type of facility, 1985-87 +.**



U.S.—REPORTED CAPITAL EXPENDITURES FOR 1985-87 + BY REGION AND TYPE OF FACILITY ($000)

PRODUCTION-RELATED EXPENDITURES

	WOOD/FIBER		PULPING		NEW MACHINES		MACHINE MOD.		ENERGY		MISC./PLANT	
New England	$ —	0%	$ 37,800	2%	$220,000	25%	$ 84,000	5%	$ 138,632	11%	$ 106,300	5%
Mid-Atlantic	—	0%	5,413	0%	—	0%	52,089	3%	134,534	11%	59,028	3%
East North Central	83,000	17%	376,158	22%	70,000	8%	679,923	43%	195,786	15%	224,239	10%
West North Central	35,000	7%	80,000	5%	50,000	6%	7,500	0%	122,600	10%	93,375	4%
South Atlantic	248,437	52%	486,027	29%	322,000	37%	314,927	20%	374,841	30%	665,725	29%
East South Central	82,400	17%	295,200	18%	60,000	7%	200,200	13%	122,200	10%	807,300	35%
West South Central	15,000	3%	208,458	12%	110,000	12%	110,705	17%	108,825	9%	354,351	15%
Mountain/Pacific	12,000	3%	188,400	11%	50,000	6%	114,253	7%	71,450	6%	12,829	1%
Total	**$475,837**		**$1,677,456**		**$882,000**		**$1,563,607**		**$1,268,868**		**$2,323,147**	

ENVIRONMENTAL QUALITY SPENDING — TOTALS

	WATER		AIR		SOLID WASTE		PRODUCTION		ENVIRONMENTAL		GRAND TOTAL	
New England	$ —	0%	$ 1,350	1%	$ 1,000	3%	$ 586,732	7%	$ 2,350	1%	$ 589,082	7%
Mid-Atlantic	1,215	1%	500	0%	1,000	3%	251,064	3%	2,715	1%	253,779	3%
East North Central	43,048	31%	49,630	26%	7,000	18%	1,629,106	20%	99,678	27%	1,728,784	20%
West North Central	28,077	20%	34,863	18%	5,000	13%	388,475	5%	67,940	18%	456,415	5%
South Atlantic	48,000	34%	63,200	33%	21,250	55%	2,411,957	29%	57,450	36%	2,544,407	30%
East South Central	695	0%	620	0%	530	1%	1,567,300	19%	1,845	0%	1,569,145	18%
West South Central	6,440	5%	29,800	16%	1,500	4%	907,339	11%	37,740	10%	945,079	11%
Mountain/Pacific	13,005	9%	9,848	5%	1,500	4%	448,942	5%	24,353	7%	473,295	6%
Total	**$140,480**		**$189,811**		**$38,780**		**$8,190,915**		**$369,071**		**$8,559,986**	

[1] Includes $1,032,700,000 for projects for startup in 1988 and after ($1,031,200,000 production; $1,500,000 environmental).

States are assigned to regions as follows:
New England: Maine, Vt., N.H., Conn., R.I., Mass.
Mid-Atlantic: N.Y., N.J., Pa.
East North Central: Wis., Mich., Ill., Ind., Ohio
West North Central: N.Dak., S.Dak., Nebr., Kans, Minn., Iowa, Mo.
South Atlantic: Del., Md., W.Va., Va., N.C., S.C., Ga., Fla.
East South Central: Ky., Tenn., Miss., Ala.
West South Central: Okla., Texas, Ark., La.
Mountain/Pacific: Wash., Ore., Calif., Alaska, Idaho, Nev., Mont., Wyo., Utah, Ariz., Colo., N.Mex.

need to keep costs down in the face of tougher competition from overseas suppliers. Paper companies also seem to be relatively optimistic about business prospects for 1986. Sales are expected to rise 6.6% and product prices 6.9% in 1986, McGraw-Hill reported, while costs for plant and equipment are expected to climb only 4.6%.

On the other hand, U.S. paper industry spending may not be as strong as its second-place showing makes it look. Preliminary figures for 1987 show plans to cut spending back to $7.74 billion, 9.8% less than 1986. In addition, companies have lowered their spending sights from those of McGraw-Hill's survey last spring. Plans for 1986 reported last fall are down 5.7% from the spring survey, while 1987 plans have dropped 7.2%.

Tax uncertainties. Prospects for tax code changes throw a wild card into estimates of future U.S. capital spending. There are conflicting views on what proposed changes would mean for the economy, and there is no clear picture of what form the final tax bill will take—if it passes at all.

Two likely features in any tax bill—withdrawal of the investment tax credit and tightening of depreciation rules—would have a direct impact on the spending picture, while provisions to impose a minimum tax on corporations and change the tax status of certain woodlands would also affect paper companies. The American Paper Institute and other critics have said that such changes would result in drastic cutbacks for paper industry profits, capital spending, and employment. Proponents of tax reform argue that the proposed measures would stimulate the economy and thus be of net benefit to business.

ABOUT *P&P's* ANNUAL SURVEY. Now in its twenty-second year, *P&P*'s annual capital spending survey covers expansion and modernization programs at U.S. and Canadian mills. Unlike surveys which track spending by year, the *P&P* survey covers spending by project. Dollar figures represent the total cost of reported projects and may sometimes include supporting equipment. The total cost of multi-year projects is assigned to the startup year and is not divided among the years of expenditure. Each survey primarily covers a three-year period, but projects with firm startup dates beyond that time frame are also included.

Complete results of P&P's *exclusive survey of North American capital spending programs for 1985-87 are available in a separate* ***Mill-by-Mill Listings*** report. *Organized by company, the listings show programs for new mills and machines, rebuilds and modernizations, environmental quality control, and other mill improvements, with specifics on equipment ordered, dates, suppliers, and prices, where available. The report is free to subscribers to* Pulp & Paper Project Report, *and it is also available separately for* US$95. *To order, send payment to* Pulp & Paper, *Editorial Dept., 500 Howard St., San Francisco, Calif. 94105.*

UNITED STATES

GRADE CONVERSIONS BOOST SPENDING; ENVIRONMENTAL OUTLAYS FALL AGAIN

■ U.S. pulp and paper companies report plans to spend $8.56 billion on capital projects in the 1985-87 period, an increase of 4.0% over spending plans reported last year. That total includes $1.03 billion for projects with startup dates in 1988 and beyond. Production-related expenditures total $8.19 billion, up 5.6% from $7.75 billion reported last year. Production spending now accounts for 96% of planned outlays, up from 94% reported last year and 90% in 1984.

Only $369 million is earmarked for environmental projects in the current period, down 22.9% from that reported last year. Pollution abatement spending is down 17.8% for water and 33.5% for air. Spending for solid waste disposal grew 73.1% in this year's survey, but the total still amounts to less than 1% of overall spending.

Spending by category. Paper machine modernizations account for $1.56 billion of planned spending in the current period, up 43.9% from last year, which indicates that mills are continuing to favor machine rebuilds over new capacity installations. As it has for the past several

TOP SPENDERS IN U.S.

Companies which have reported capital spending plans of $100,000,000 or more, including both production and environmental programs

	1985-87	1984-86
Champion International	$1,047,007,000	$1,118,442,000
International Paper	889,000,000*	804,000,000
Pentair Industries	725,000,000*	152,215,000*
Scott Paper	617,000,000	453,500,000
Fort Howard Paper	600,000,000	173,500,000
Bowater	500,850,000	531,130,000
Hammermill Paper	406,770,000	369,651,000
Georgia-Pacific	380,000,000	300,800,000
Consolidated Papers	311,200,000	298,950,000*
Southwest Forest Industries	300,000,000*	n.a.
Great Northern Nekoosa	231,628,000*	602,950,000
Temple-Inland	200,705,000	194,800,000
Manistique Papers	183,000,000	n.a.
Westvaco	180,000,000	310,100,000
James River	177,500,000	300,470,000*
Weyerhaeuser	164,000,000	248,000,000
Potlatch	142,041,000	186,720,000*
Mead	139,000,000	134,000,000
Union Camp	165,000,000	644,680,000
Chesapeake	123,500,000	110,000,000
Stone Container	117,750,000	n.a.

*Includes programs for completion beyond 3-year period indicated.

years, planned spending for paper machine rebuilds grew as a percentage of total spending, rising this year to over 18% of the total. That compares with 13% in last year's survey, 11% in 1984, and only 6% in 1983.

Spending for new paper machines jumped from 5% of total spending in 1984 to 10% in last year's survey, when a number of new machine projects were announced. New machines account for 10% of total planned spending in this year's survey as well (see table p. 107). Companies report plans to spend an estimated $882 million for new machines in the 1985-87 period, up 11.6% from last year's survey.

With fewer expensive chemical pulping projects planned, spending in the pulping category declined 4.0% this year, to $1.68 billion. At almost 20% of the total, however, pulping is still the largest category after miscellaneous and plant expenditures.

The biggest change in this year's spending picture is for energy and power projects, where planned spending of $1.27 billion is down 23.2% from last year. One factor may be lower prices for oil and other sources of purchased energy, which reduce the incentive to invest in cost reduction projects. Power projects also seem to be an area where mills are able to cut costs. Scott Paper Co. completed a major power plant modernization at Mobile, Ala., late last year at a cost of $267 million, well under the $300 million originally budgeted. And the budget for Potlatch Corp.'s new power boiler at Lewiston, Idaho, was reduced last fall from $159 million to $83 million.

MAJOR MODERNIZATION/ EXPANSION PROJECTS IN U.S.

(over $50,000,000 at an existing mill site)

	1985-87
Appleton Papers, Combined Locks, Wis.	$ 54,900,000
Bowater Southern, Calhoun, Tenn.	78,000,000
Bowater Carolina, Catawba, S.C.	358,500,000*
Bowater/Catawba, Catawba, S.C.	64,350,000
Champion International, Bucksport, Maine	124,582,000
Champion International, Canton, N.C.	72,000,000
Champion International, Lufkin, Texas	87,600,000
Champion International, Pasadena, Texas	58,000,000
Champion International, Pensacola, Fla.	209,800,000
Chesapeake, West Point, Va.	123,500,000*
Consolidated Papers/Biron, Wisconsin Rapids, Wis.	249,000,000*
CCA, Fernandina Beach, Fla.	50,000,000
Federal Paper Board, Augusta, Ga.	78,850,000
Fort Howard Paper, Muskogee, Okla.	100,000,000*
Georgia-Pacific, Crossett, Ark./Palatka, Fla.	100,000,000*
Georgia-Pacific, Monticello, Miss.	80,000,000
Georgia-Pacific, Zachary, La.	200,000,000*
GNN, East Millinocket, Maine	157,800,000
Gulf States Paper, Demopolis, Ala.	50,006,000
Hammermill Paper, Erie, Pa.	81,900,000
Hammermill/Thilmany, Kaukauna, Wis.	52,081,000
Hammermill Paper, Selma, Ala.	253,000,000*
International Paper, Mobile, Ala.	600,000,000
International Paper, Pine Bluff, Ark.	214,000,000
James River, Pennington, Ala.	120,000,000*
Manistique Papers, Manistique, Mich.	183,000,000
Mead, Chillicothe, Ohio	105,000,000
Pentair Industries, Niagara, Wis.	122,000,000
Pentair/Flambeau, Park Falls, Wis.	57,000,000†
Pentair/Port Huron, Port Huron, Mich.	97,000,000†
Potlatch Pulp/Paperboard, Lewiston, Idaho	99,212,000
Scott Paper, Chester, Pa.	115,000,000
Scott/S.D. Warren, Mobile, Ala.	282,000,000
Scott/S.D. Warren, Skowhegan, Maine	220,000,000*
Jefferson Smurfit, Jacksonville, Fla.	67,200,000†
Southwest Forest, Panama City, Fla.	300,000,000†
Stone Container, Florence, S.C.	100,000,000
Temple-Inland, Evadale, Texas	62,000,000
Union Camp, Franklin, Va.	131,000,000
Westvaco, Covington, Va.	180,000,000*

*Includes new paper machine.

†Includes programs for completion in 1988 and later.

U.S. GREENFIELD MILL PROJECTS

UNDER CONSTRUCTION OR STARTED UP IN 1985	Startup
Champion International, Quinnesec, Mich. 750-tpd bleached hardwood kraft market pulp	1985
Laurel Hill Paper, Cordova, N.C. Renovated textile plant, 50 tpd tissue*	1985
Temple-Inland, Ontario, Calif. 175,000-tpy recycled linerboard*	1985
Fort Howard Paper, Rincon, Ga. 380-tpd recycled tissue;* three more paper machines will raise total to 1,620 tpd by 1992	1987

ANNOUNCED WITH STARTUP DATE	
Pentair, Duluth, Minn. 235,000-tpy clay-filled SC paper*	1988

PROPOSED (NO STARTUP DATE)

Augusta Kraft, Augusta, Ga.
Proposed 262,500-tpy kraft linerboard mill

Boise Cascade, S.C.
Reportedly building a timberland base to support a future pulp/paper complex

Carolina Forest, Bennetsville, S.C.
Proposed two-machine, 1,500-tpd TMP/newsprint mill; no recent activity

Champion International, Halifax, N.C.
Proposed bleached pulp/white paper mill; project postponed indefinitely

Champion International, Jasper, Texas
Proposed pulp/paper mill; postponed indefinitely

Georgia Kraft, Elberton, Ga.
Site purchased in 1981 for future 1,300-tpd linerboard mill

Great Lakes Forest Products, Usk, Wash.
154,000-mtpy TMP/newsprint mill*; postponed until market conditions improve

Grenada Paper, Grenada, Miss.
Proposed 200,000-tpy TMP/newsprint mill, on hold

Independent Kraft, Tuscaloosa, Ala.
Proposed 280,000-tpy kraft linerboard mill; on hold

Kimberly-Clark, southeastern U.S.
Reportedly consicering disposable diaper pulp mill; no recent activity

Undetermined, Richmond, Calif.
175,000-tpy recycled newsprint mill under study by city

*Paper machine also included in New Machine table.

Average capacity growth ahead. Capital spending won't get much of an extra boost from capacity additions over the next three years, according to the American Paper Institute's latest capacity survey. API expects paper and paperboard capacity to grow an average of 2.0% a year between now and 1988, a little below the ten-year average annual rate of 2.1% a year. Pulp capacity growth will average 1.2% a year through 1988, API reports, well below the ten-year average of 2.1%.

One factor that should tend to keep spending higher than those numbers suggest, however, is the emerging trend toward grade conversion. Instead of simply shutting down unprofitable machines, mills are spending the funds necessary to convert them to other products. API reports that at least eight large paper machines, with total capacity for 1.2 million tpy, will be converted between 1985 and 1988 to more profitable grades.

International Paper Co. has been a leader in this area, beginning with the conversion of its Georgetown, S.C., mill to white paper and market pulp in 1984. In 1985 and 1986, IP is spending $500 million to convert its Mobile, Ala., mill from newsprint and brown papers to uncoated free sheet and bleached kraft papers and its Pine Bluff, Ark., mill from newsprint to coated publication paper.

Georgia-Pacific Corp. converted two mills in 1985: a $100-million printing paper machine replaced an old unbleached kraft unit at Crossett, Ark., and the company rebuilt a "swing" unbleached kraft paper/board machine at Monticello, Miss., to produce mainly kraft linerboard. Chesapeake Corp. will convert a kraft linerboard machine to recycled corrugating medium in a $28-million project targeted for late 1986 or early 1987.

Integrating market pulp. Along with newsprint and brown paper/board, bleached kraft market pulp has become a prime candidate for conversion because of overcapacity and poor markets. G-P is integrating its Port Hudson market pulp mill at Zachary, La., with a new uncoated free-sheet machine in a $200-million project to be completed this year. Hammermill is also integrating a market pulp mill to uncoated free sheet in a $190-million project at Selma, Ala. Champion plans to install a paper machine at its new $500-million bleached kraft market pulp mill at Quinnesec, Mich., which started up late last year, although that new machine has been postponed until the company can reduce debt incurred in the acquisition of St. Regis in 1984.

NEW MILLS AND MACHINES. Two major greenfield mills were completed in 1985: Champion's 750-tpd Quinnesec mill and Temple-Inland Inc.'s $130-million, 175,000-tpy recycled linerboard mill at Ontario, Calif. Two more greenfield projects are now definitely in the works: Fort Howard Paper Co.'s recycled tissue mill at Rincon, Ga., and Pentair Inc.'s supercalendered groundwood mill at Duluth, Minn. The Fort Howard mill will come onstream in stages, with two machines with capacity for about 700 tpd planned for installation by 1988

NEW PAPER MACHINES IN U.S.

UNDER CONSTRUCTION OR STARTED UP IN 1985	Startup
Chesapeake, West Point, Va. 900-tpd, 258-in. Voith No. 3—linerboard	1985
Fort Howard, Muskogee, Okla. No. 4 tissue machine	1985
Georgia-Pacific, Crossett, Ark. 300-tpd No. 1 Sulzer Escher Wyss—white paper	1985
Temple-Inland, Ontario, Calif. 175,000-tpy Tampella—recycled liner	
Bowater Carolina, Catawba, S.C. 197,000-tpy No. 2 Beloit—LWC	1986
Consolidated/Biron Div., Wisconsin Rapids, Wis. 660-tpd, 324-in.-trim Voith—LWC	1986
Georgia-Pacific, Zachary, La. 230,000-tpy, 378-in.-trim Valmet—uncoated free sheet	1986
Hammermill, Selma, Ala. 660-tpd, 350-in.-trim Voith—uncoated free sheet	1986
James River, Pennington, Ala. 70,000-tpy, 260-in.-trim Beloit—tissue	1986
Kimberly-Clark, Whiting, Wis. 90-tpd Sulzer Escher Wyss—cotton fiber	1986
Scott/S.D. Warren, Skowhegan, Maine 215,000-tpy Beloit—coated free sheet	1986
Westvaco, Covington, La. 175,000-tpy Voith—bleached paperboard	1986
Fort Howard, Rincon, Ga. 380-tpd tissue machine	1987

ANNOUNCED, WITH STARTUP DATE	
Fort Howard, Rincon, Ga. Three tissue machines (1988, 1990, 1992)	1988-92
Pentair, Duluth, Minn. 235,000-tpy, 285-in.-trim—SC paper	1988

PROPOSED (NO STARTUP DATE)

[illegible]fin Paper, Grand Rapids, Mich.
[illegible]000-tpy, 280-in.-trim LWC, targeted for 1988
[illegible] Cascade, International Falls, Minn.
Proposed uncoated free sheet, on hold since 1982
Champion International, Quinnesec, Mich.
500-600-tpd uncoated free sheet machine; indefinitely postponed
Champion International, undetermined
LWC machine was under study; indefinitely postponed
Chesapeake/Wisconsin Tissue, Menasha, Wis.
Studying No. 4 tissue machine
Crown Zellerbach, Bogalusa, La.
New machine proposed for tissue expansion
Crown Zellerbach, South Glens Falls, N.Y.
Install 6,000-fpm tissue machine; delayed
Great Northern Nekoosa, Ashdown, Ark.
210,000-tpy No. 64 uncoated free sheet under study
International Paper, undetermined
150,000-tpy coated free sheet machine
Longview Fibre, Longview, Wash.
No. 12 lightweight kraft paper machine
Midtec Paper, Kimberly, Wis.
No. 7 coated free-sheet machine under study
Potlatch, Cloquet, Minn.
New machine could replace old uncoated free sheet capacity
Potlatch, McGehee, Ark.
Second SBS board machine under consideration
Southeast Paper Mfg., Dublin, Ga.
450-tpd recycled newsprint machine under active study
Union Camp, Eastover, S.C.
Considering second free-sheet machine
Westvaco, unspecified
New machine(s) for coated free-sheet expansion
Weyerhaeuser, Columbus, Miss.
Second LWC machine, reportedly for 1987 startup
Weyerhaeuser, Columbus, Miss.
Uncoated free-sheet machine on hold

in the $450- to $500-million first phase, and two more machines planned by 1992. The $400-million, 235,000-tpy Pentair facility is targeted for startup in 1988.

Four new paper machines started up at U.S. mills in 1985, the same number as in 1984. Besides the G-P and Temple-Inland machines mentioned above, these include Fort Howard's No. 4 tissue machine at Muskogee, Okla., and Chesapeake's 900-tpd No. 1 kraft linerboard machine at West Point, Va.

Eight machines are scheduled for startup in 1986, all but two of them in the printing and writing grades, where a large capacity buildup averaging 3.9% a year is well under way. New lightweight coated groundwood machines are under construction at Consolidated Papers Inc.'s Biron Div. mill at Wisconsin Rapids, Wis., and Bowater Carolina Corp.'s Catawba, S.C., mill. Uncoated free-sheet machines are coming onstream at G-P and Hammermill market pulp mills, as detailed above. Scott's S.D. Warren Div. is installing a second coated free-sheet machine at the Skowhegan, Maine, mill, and Kimberly-Clark Corp.'s Whiting, Wis., mill will get a new cotton fiber paper machine this year. In other grades, James River Corp. will install a new tissue machine at the Pennington, Ala., mill in 1986, while Westvaco Corp. will start up a new solid bleached paperboard unit at Covington, Va.

Proposed expansions depend on markets. There are several major projects in addition to those already scheduled that could move forward quickly if business picks up. Great Lakes Forest Products Ltd. was proceeding with a new newsprint mill in Usk, Wash., for startup in 1987, but that project was put on hold last month until market conditions improve. Another victim of the economic downturn is Blandin Paper Co., which announced a new lightweight coated paper machine for startup at its Grand Rapids, Mich., mill in 1988. That project was put on hold due to financing problems. Another LWC machine project is currently on hold at Weyerhaeuser's Columbus, Miss., mill, but observers report that this project may be reinstated early this year.

Champion International could move forward on several fronts if its divestiture strategy to reduce debt following the acquisition of St. Regis Corp. continues to go smoothly. Champion has three major project proposals on the back burner besides the paper machine on hold at Quinnesec: a lightweight coated paper machine for an unspecified St. Regis mill, a new coater for the Courtland, Ala., mill, and a new bleached pulp/white paper mill proposed for Halifax, N.C.

In the kraft linerboard sector, plans are proceeding for Augusta Kraft Co.'s proposed greenfield mill at Augusta, Ga. Also under active consideration is Independent Kraft Corp.'s proposed Tuscaloosa, Ala., mill, which is on hold pending a market upturn. In newsprint, Grenada Paper Co.'s proposed greenfield mill at Grenada, Miss., and a second machine for Southeast Paper Mfg. Co. are awaiting better market conditions.

CANADA

NO SHORTAGE OF PROJECTS, BUT MARKETS MAKE SPENDING PLANS UNCERTAIN

■ Conflicting signals lead to an uncertain outlook for capital spending in the Canadian industry. Although spending seems headed for a new record in 1985, according to Statistics Canada's most recent survey, *P&P*'s survey of three-year spending plans shows a drop from last year. Present business conditions further cloud the picture. Strong competition in Canada's export markets has increased the need to modernize equipment to lower production costs, as well as the incentives for converting machines to more profitable products. At the same time, lower prices have kept profit margins down, making it difficult to pay for modernization and conversion projects, particularly since many companies are still suffering from high debt incurred in the huge capacity buildup of the late 1970s. Thus many capital projects may have to wait for better market conditions.

Canadian pulp and paper companies report plans to spend C$4.10 billion in the 1985-87 period, down 10.2% from the $4.57 billion reported last year, *P&P*'s survey shows. Reported production-related expenditures totaled $3.87 billion in this year's survey, down 10.0% from last year's $4.30 billion, while planned environmental outlays come to $233 million, down 14.3%.

Spending by category. Fueled by a number of mechanical pulp project announcements, spending for pulping improvements jumped 18.6% in this year's survey, to $1.30 billion. Traditionally running about 35% of the total, pulping projects accounted for 32% of planned expenditures in this year's survey, up from only 24% last year. Energy expenditures rose this year after a sharp drop in last year's survey, rising 37.9% to $362 million.

Reported spending for new paper machines is down 17% this year, and outlays for machine rebuilds suffered a 21% drop. New machines account for 10% of total spending, the same as last year, while machine rebuilds slipped to 22% from 26% last year.

Capacity expansion. Paper and board capacity expansion will run slightly below average over the next three years, according to the Canadian Pulp & Paper Assn.'s most recent survey. Paper and board additions will average 1.3% a year, down slightly from the ten-year average of 1.4%, with most of the growth coming in the smaller grade segments, such as groundwood printing and specialties. But spending for expansion projects should be higher than the modest growth rate suggests, since retirement and conversion of old capacity is what is keeping growth low, not the lack of new projects.

Newsprint additions. After a lull of several years, Canada's important newsprint segment appears to be heating up again, although capacity is expected to grow only 2.4% by 1987 because of conversions and retirements. James Maclaren Industries Inc. recently completed a $148-million expansion at Masson, Que., which included a new 196,000-metric-tpy newsprint machine. Also in Quebec, CIP Inc. announced last June that it would install a new 155,000-metric-tpy newsprint machine at Gatineau by 1987, and Donohue Inc. followed suit two months later with a $160-million, 180,000-metric-tpy new machine project at Clermont, also scheduled to start up in 1987.

Several newsprint mills have undertaken major modernization programs to upgrade existing equipment. Boise Cascade Canada is spending $219 million at Kenora, Ont., in a program concentrating on the pulp mill and woodyard. Paper machine improvements and a new TMP mill are planned in an $86-million program at Consolidated-Bathurst's Shawinigan, Que., mill, and Con-Bath will spend over $50 million upgrading newsprint machines at Port Alfred. New TMP capacity and newsprint machine improvements are also under way in a $105-million project at Kimberly-Clark of Canada's Spruce Falls mill in Kapuskasing, Ont.; a $59-million upgrade at Kruger's Bromptonville, Que., mill, and a $200-million program at Kruger's Corner Brook, Nfld., mill. Ontario Paper Co. plans to spend $158 million on improvements at the Q.N.S. mill at Baie Comeau, Que., and Reed will complete a $275-million, seven-year modernization at Quebec City, Que., this year.

In addition to these scheduled projects, newspaper publisher Quebecor Inc. has proposed a 180,000-metric-tpy newsprint mill for the Matane region of Quebec. If approved, the $250-million Quebecor project would be targeted for 1988 startup. Also under consideration is a new newsprint machine at Abitibi-Price Inc.'s Iroquois Falls, Que., mill, although the company has yet to decide the timing of that project.

Printing and writing. Quebecor's proposed newsprint mill reportedly has competition for the Matane site from a Norwegian company, Saugbrugsforeningen, which wants to build a coated paper mill in the region. Canada's hottest segment for capacity growth is printing and writing papers. Groundwood printing and specialty ca-

TOP SPENDERS IN CANADA

Companies which report capital spending plans of C$100,000,000 or more, including both production and environmental programs

	1985-87	1984-86
Domtar	C$904,451,000*	C$1,021,014,000
Kruger	328,600,000*	237,000,000
Repap Enterprises	280,000,000	223,000,000
Boise Cascade Canada	272,600,000	261,800,000
Consolidated-Bathurst	253,300,000*	203,000,000*
Abitibi-Price	249,700,000	272,150,000*
Ontario Paper Co.	237,800,000	114,891,000
CIP	165,900,000	102,000,000
Tembec	151,000,000*	174,700,000*
James Maclaren Industries	148,000,000	224,000,000
Western Pulp	145,900,000	229,200,000
E.B. Eddy Forest Products	130,383,000*	141,690,000*
Makin Pulp & Paper	115,000,000	115,000,000
James River-Marathon	104,733,000	95,000,000

*Includes programs for completion beyond 3-year period indicated

CANADA—REPORTED CAPITAL EXPENDITURES FOR 1985-87 +
BY REGION AND TYPE OF FACILITY (C$000)

PRODUCTION-RELATED EXPENDITURES

	WOOD/FIBER		PULPING		NEW MACHINES		MACHINE MOD.		ENERGY		MISC./PLANT	
Maritimes	$ 34,826	31%	$ 133,884	10%	$ 50,000	13%	$118,240	13%	$120,735	33%	$126,486	16%
Quebec	11,075	10%	749,570	58%	292,000	74%	405,752	44%	153,170	42%	468,058	60%
Ontario	47,573	43%	149,427	11%	28,000	7%	373,518	41%	35,819	10%	161,001	21%
Central	—	0%	—	0%	—	0%	3,100	0%	150	0%	2,000	0%
West	17,100	15%	268,512	21%	25,000	6%	15,100	2%	52,600	15%	24,366	3%
Total	**$110,574**		**$1,301,393**		**$395,000**		**$915,710**		**$382,474**		**$781,911**	

ENVIRONMENTAL QUALITY SPENDING / TOTALS

	WATER		AIR		SOLID WASTE		PRODUCTION		ENVIRONMENTAL		GRAND TOTAL	
Maritimes	$ 20,000	17%	$ 30,343	37%	$ 3,000	8%	$ 584,171	15%	$ 53,343	2%	$ 637,514	16%
Quebec	68,870	61%	27,600	34%	8,263	22%	2,079,625	54%	105,733	45%	2,185,358	53%
Ontario	6,685	6%	3,906	5%	1,453	4%	795,338	21%	12,044	5%	807,382	20%
Central	—	0%	—	0%	—	0%	5,250	0%	150	0%	5,250	0%
West	17,819	16%	19,585	24%	24,230	66%	402,678	10%	61,634	26%	464,312	11%
Total	**$114,374**		**$ 81,434**		**$ 36,946**		**$3,867,062**		**$232,754**		**$4,099,816**	

1. Includes C$1,215,579,000 for projects for startup in 1988 and after ($1,214,421,000 production; $1,158,000 environmental)

Provinces are assigned to regions as follows: Maritimes: New Brunswick, Newfoundland, Nova Scotia; Central: Manitoba, Saskatchewan; West: British Columbia, Alberta.

pacity will jump 30.3% by 1987, while book, writing, and miscellaneous grades will climb 11.2%.

Repap Enterprises is building a 200,000-metric-tpy lightweight coated groundwood mill at Newcastle, N.B., for startup in 1986. Cost of the project is $280 million. In Quebec, Domtar Inc. is proceeding with the $754-million modernization at its Windsor mill, which includes a 175,000-metric-tpy uncoated free-sheet machine for 1987 startup and a similar unit in 1989. On the other side of the continent, Makin Pulp & Paper Ltd. plans to break ground soon on a $115-million, 200-metric-tpd coated and uncoated groundwood mill at Britannia Beach, B.C. Chief among the groundwood specialties projects is Abitibi's $110-million conversion to supercalendered groundwood at Jonquière, Que.

Pulp expanions. Pulp capacity will grow an average of 1.2% a year through 1987, according to the CPPA, which is well above the ten-year average of 0.7% a year. That trend will not boost spending as much as it would have in past years, however, since the growth is concentrated in less expensive TMP and CTMP additions. TMP capacity will grow 22.2% by 1987, according to the CPPA. Only three chemical pulping projects, all bleached kraft, made the list of major mill programs in this year's survey: James River-Marathon Ltd.'s $105-million expansion at Marathon, Ont.; Western Pulp Inc.'s $214-million modernization at Squamish, B.C.; and a new kraft pulp mill at Domtar's Windsor, Que., mill.

Tembec is scheduled to complete a new $103-million, 100,000-metric-tpy bleached market CTMP mill at Temiscaming, Que., this spring. In B.C., two new market pulp mill projects have been proposed: Fibreco Export is looking at sites in the interior of the province for a 170,000-metric-tpy CTMP mill, and Dong Bang Chemical of Korea is studying an 82,500-metric-tpy neutral sulfite anthraquinone pulp mill for Ocean Falls, B.C. ■

MAJOR MODERNIZATION/ EXPANSION PROJECTS IN CANADA

(over C$50,000,000 at an existing mill site, 1985-87)

Abitibi-Price, Jonquiere, Que.	C$110,000,000
Boise Cascade Canada, Fort Frances, Ont.	53,400,000
Boise Cascade Canada, Kenora, Ont.	219,200,000
CIP, Gatineau, Que.	67,700,000*
CIP, Trois Rivieres, Que.	75,700,000
Consolidated Bathurst, Shawinigan, Que.	85,600,000†
Con-Bathurst, Ville de La Baie, Que.	51,700,000†
Domtar, Windsor, Que.	754,000,000*†
Donohue, Clermont, Que.	86,681,000*
E.B. Eddy Forest Products, Espanola, Ont.	105,480,000†
James Maclaren Industries, Masson, Que.	148,000,000*
James River-Marathon, Marathon, Ont.	104,733,000
Kimberly-Clark of Canada, Kapuskasing, Ont.	105,000,000
Kruger, Bromptonville, Que.	58,600,000
Kruger, Corner Brook, Nfld.	200,000,000†
Kruger, Trois Rivieres, Que.	70,000,000
Ontario/Q.N.S. Paper, Baie Comeau, Que.	158,400,000†
Ontario Paper, Thorold, Ont.	79,400,000†
Reed, Quebec City, Que.	68,800,000
Tembec, Temiscaming, Que.	151,100,000†
Western Pulp, Squamish, B.C.	109,000,000

*Includes new paper machine
†Includes programs for completion in 1986 and later

NEW PAPER MACHINES IN CANADA

(metric tons)

UNDER CONSTRUCTION OR STARTED UP IN 1985	Startup
James Maclaren Industries, Masson, Que. 196,000-tpy, 330-in.-trim, 4,500-fpm Beloit—newsprint	1985
CIP, Gatineau, Que. 155,000-tpy, 256-in.-trim No. 4 Voith—newsprint	1987
Domtar, Trenton, Ont. 99,000-tpy, 195-in.-trim Black Clawson—corrugating medium	1986
Domtar, Windsor, Que. 175,000-tpy, 330-in.-trim Beloit—uncoated free sheet	1987
Donohue, Clermont, Que. 180,000-tpy Valmet-Dominion—newsprint	1987
ANNOUNCED WITH STARTUP DATE	
Domtar, Windsor, Que. Second 175,000-tpy, 330-in. machine—uncoated free sheet	1989
PROPOSED (NO STARTUP DATE)	
Abitibi-Price, Iroquois Falls, Ont. Proposed newsprint machine; timing not decided	
Kruger, Trois Rivières, Que. 172,000-tpy No. 10 Beloit; postponed indefinitely—newsprint	
Prince Albert Pulp, Prince Albert, Sask. LWC or SC paper machine under study	
St. Marys Paper, Sault Ste. Marie, Ont. Proposed 156,000-tpy No. 5 SC groundwood machine; postponed	

GREENFIELD MILLS—CANADA

(metric tons)

UNDER CONSTRUCTION	Startup
Repap Enterprises, Newcastle, N.B. 200,000-tpy lightweight coated mill, with pulp supplied from nearby Nelson-Miramichi and Newcastle pulp mills*	1986
TemPart, Temiscaming, Que. 100,000-tpy bleached CTMP for market; turnkey installation by Sunds Defibrator	1986
ANNOUNCED WITH STARTUP DATE	
Makin Pulp & Paper, Britannia Beach, B.C. 200-tpd CMP/groundwood mill	1986
PROPOSED (NO STARTUP DATE)	
Doman Industries, Nanaimo, B.C. Proposed 500-tpd TMP mill, possibly to include newsprint machine, on indefinite hold	
Dong Bang Chemical Co., Ocean Falls, B.C. Studying 82,500-tpy neutral sulfite anthraquinone market pulp mill	
Fibreco Export, interior British Columbia Studying sites for 170,000-tpy bleached market CTMP mill	
Quebecor, Matane, Que. Proposed 180,000-tpy newsprint mill	
Saugbrugsforeningen of Norway, Matane, Que. Proposed coated paper mill reportedly under consideration by provincial government	

*Paper machine included in New Machine table.

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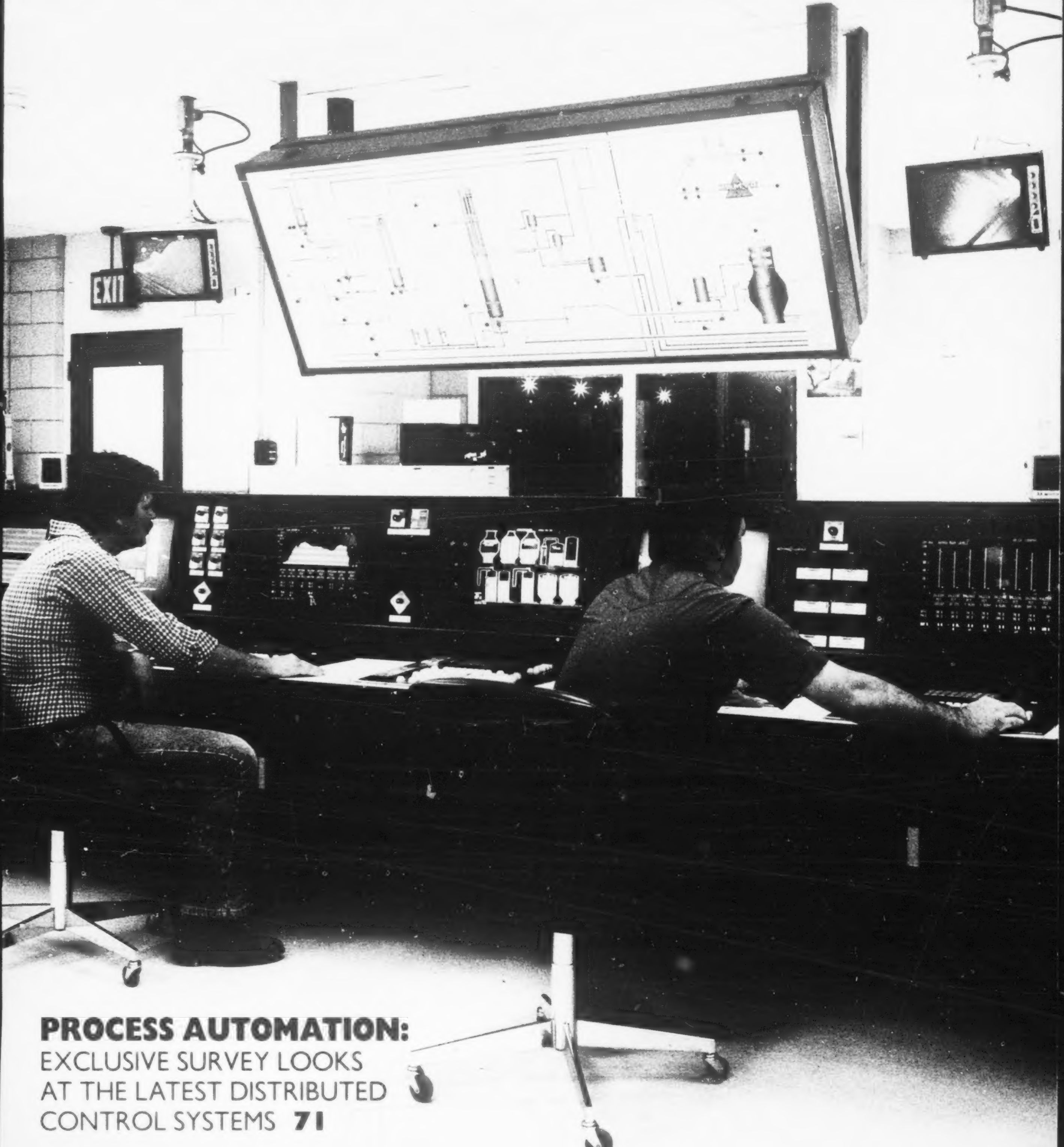
PULP & PAPER

February 1986



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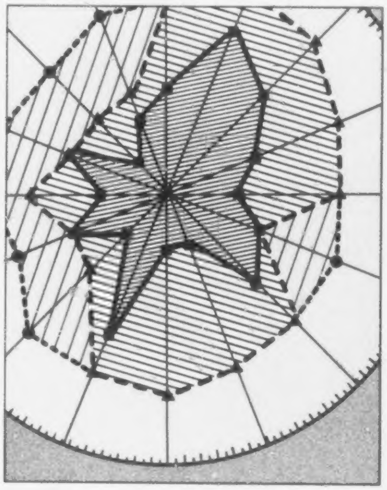

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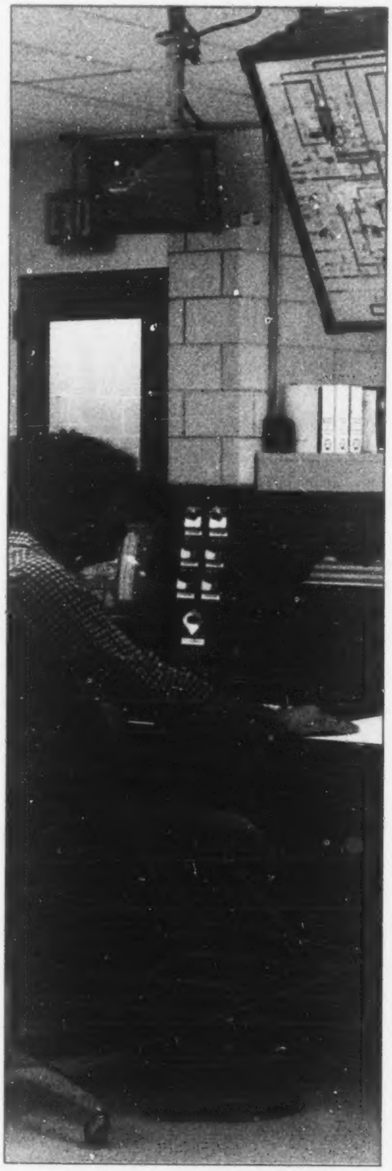

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(Photo courtesy of Honeywell Inc.)

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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Subscriptions & Address Change: Sent without charge in the U.S.A. & Canada (upon written request) to individuals in pulp, paper, and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $50.00 a year in the U.S. All subscriptions to other countries: $70.00 a year, except Europe and Mediterranean, $80.00 (air service included). Single copy, $4.50, except Buyers Guide, $30.00. Photocopies of articles and complete microform volumes available through University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106.

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Circulation Department, PULP & PAPER,
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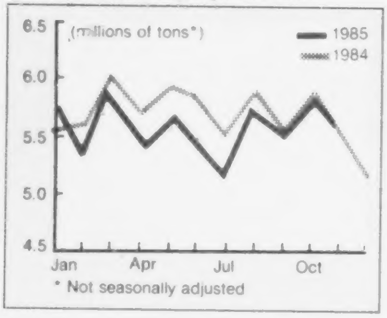
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 5.6 million tons in November 1985, up 0.4% from the same month the previous year, according to the American Paper Institute. November's total was the first since December 1984 to exceed its year-earlier level. Production on an annualized basis through November was still off 2.4% from 1984, however, and API said that the trend of production still points toward a 2.5% decline to 66.8 million tons for 1985.

Among major grades, uncoated free-sheet continued to strengthen, rising 4.9% over 1984's level, but groundwood and coated papers remained weak. Production of kraft linerboard for export jumped 34.8% in November but was still down 17.9% for the year, helping keep total unbleached kraft board production below year-earlier levels. Containerboard inventories were down 7.8% on Nov. 1, and corrugated box shipments slipped 2.2% to 20.7 billion ft^2 for the month, the Fibre Box Assn. said.

Canadian newsprint shipments continued their slow decline, falling 0.5% in November. Operating rates stood at 93% for the month. Canadian pulp shipments climbed 4.3% above 1984 levels, but November operating rates slipped to 92%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Nov.	438	−4.8	5,443	−2.4
Uncoated groundwood (s)	Nov.	137	7.9	1,511	−4.6
Coated paper (s)	Nov.	473	−8.7	5,908	−5.7
Uncoated free sheet (s)	Nov.	817	12.1	9,731	4.9
Other printing/writing	Nov.	114	−76.6	1,343	−77.3
Total packaging and other paper (s)	Nov.	421	−1.6	5,236	−7.2
Tissue	Nov.	412	3.0	4,933	.5
Total paper	**Nov.**	**2,812**	**1.0**	**34,107**	**−1.5**
Unbleached kraft paperboard	Nov.	1,354	−2.7	16,494	−5.2
Semichemical medium	Nov.	427	3.9	5,095	−2.2
Bleached paperboard	Nov.	327	−1.2	3,973	−2.8
Recycled paperboard	Nov.	659	3.1	7,749	.2
Total paperboard	**Nov.**	**2,767**	**−.2**	**33,310**	**−3.2**
Total U.S. paper and paperboard output	**Nov.**	**5,580**	**.4**	**67,417**	**−2.4**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Oct.	4,777	−.4	54,479	−2.8
Market pulp production	Oct.	572	−9.9	6,806	−1.5
Wastepaper consumption at paper/board mills	Oct.	1,309	−5.8	15,222	−3.9
Pulpwood consumption (cords)	Oct.	7,666	.5	86,070	−2.6
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft^2)	Nov.	20.726	−2.2	246.883[6]	−1.4
Containerboard inventories at U.S. box plants and mills	Nov. 1	2,492	−7.8		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Oct.	987	14.2	11,161	5.1
Imports of Canadian newsprint	Oct.	692	9.1	8,140[6]	5.9
U.S. paper exports (including products)	Oct.	334	−5.4	4,024	−9.6
Exports of unbleached kraft linerboard	Nov.	151	34.8	1,745	−17.9
Exports of woodpulp	Oct.	269	−5.3	3,762	4.2
Norscan pulp inventories[4]	Nov. 31	1,554	4.0		
Norscan pulp operating rates[4]	Nov.	91%	90%	79%	87%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Nov.	760	−1.3	8,211[6]	−.5
Operating rates	Nov.	93%	94%	92%	92%
Inventories held by U.S. consumers	Nov. 31	1,435	4.3		
Other paper/board shipments	Nov.	278	15.4	2,818	11.1
Woodpulp shipments (export only)	Nov.	602	3.4	6,379[6]	4.3
Operating rates	Nov.	92%	96%	88%	87%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

TISSUE: Another good year seems likely

Grade structure:
Tissue falls into two major groups: sanitary and "other." About 98% of total output is represented by sanitary; major sanitary grades include bathroom, facial, toweling, napkins, basestock for sanitary stock, wadding, and wipes. The "other" group includes basestock for waxing, wrapping, and miscellaneous. Tissue can also be broken down into consumer products—made to be sold to the general public (about two thirds of output)—and that made to be used in factories, hotels, restaurants, office buildings, and other commercial and industrial settings. Typical basis weights for tissue include 12 to 14 lb/3,000 ft² for single-ply bathroom tissue and 32 to 39 lb/3,000 ft² for single-ply towel.

Production/capacity:
The U.S. tissue industry produced record volumes once again in 1985, but due to an increase in capacity, the industry's operating rate actually dropped by about a point. Capacity in 1986 should rise by about 2%, with only James River Corp.'s 70,000-tpy machine in Naheola, Ala., starting up during the year.

When Crown Zellerbach Corp. announced last year it was indefinitely delaying the expansion of its South Glens Falls, N.Y., mill, the field was narrowed to Fort Howard Paper Co., which is now the only tissue company with announced expansion plans on the drawing board aside from James River.

Fort Howard will bring its new North Savannah, Ga., mill onstream in mid-1987, but the market should absorb this capacity successfully. The American Paper Institute's annual capacity survey projects capacity for the industry rising just 3.2% between 1986 and 1988, which should allow for a continuation of recent operating trends, barring any steep recession.

Outlook:
Most economists foresee a year of moderate but healthy growth in the U.S. economy in 1986, with the GNP rising by anywhere from 2% to 4%. With capacity also rising at a moderate rate, this suggests a continuation of 1985's stable markets.

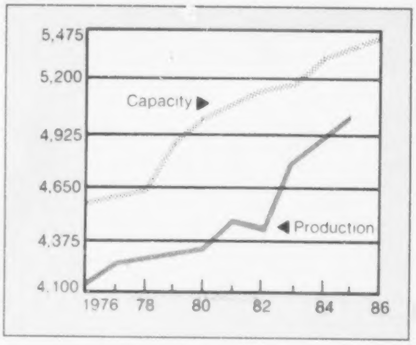
A recession in 1986 or 1987 would interrupt what has become the first period of price stability in the decade, however. In 1984 the industry began to attack the promotional discounting that had plagued price structures in recent years. Plus, Procter & Gamble Co. appeared to shift from a policy of selective price increases to supporting more general hikes. These trends enabled the consumer industry to hold onto a substantial part of the 5% to 8% hikes that took effect in the first quarter of 1985. Commercial and industrial mills also raised quotes by about 6% in mid-1985.

Prices strengthened throughout the year, and if market conditions continue to hold steady, the industry may be able to get prices up again in 1986.

Prices:
Price trends tracked by the Bureau of Labor Statistics' producer price index for sanitary papers and health products are as follows (year-end, 1967 = 100): 1974, 181.1; 1975, 201.7; 1976, 223.5; 1977, 240.7; 1978, 264.3; 1979, 291.0; 1980, 338.8; 1981, 348.4; 1982, 361.0; 1983, 359.7; 1984, 371.4; 1985 (third quarter), 379.0.

Markets:
Breakdown of major tissue end uses is as follows: toilet, 39% (of which 54% is single-ply and 46% is multi-ply); towels, 33%; facial, 7%; napkins, 13%; wipes, 1%; sanitary napkin stock, 2%; other sanitary, 2%; nonsanitary, 2%. Nonsanitary tissue shipments fell from 230,500 tons in 1972 to 110,000 tons in 1983. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

	1984	1985	1986e
Production[1]	4,921	4,933	4,995
Capacity[1]	5,276	5,338	5,446
Utilization rate	93.3%	92.4%	91.7%
Imports[2]	30	56	40
Exports[2]	17	19	19
Apparent U.S. consumption	4,934	4,970	5,016
lb/capita	41.9	41.8	41.8
GNP ratio	3.01	2.96	2.91

e = Estimate.
1. American Paper Institute data.
2. U.S. Dept. of Commerce data.

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity	Market share (%)
1. Scott Paper	1,035	19.0
2. Procter & Gamble	900	16.5
3. Fort Howard Paper	620	11.4
4. James River	560	10.3
5. Georgia-Pacific	510	9.4
6. Kimberly-Clark	400	7.3
7. Crown Zellerbach	328	6.0
8. Potlatch	300	5.5
9. Wisconsin Tissue	110	2.0
10. APL	95	1.7

Market share of top five companies:
66.6%

Market share of top ten companies:
89.2%

Total U.S. capacity (1986):
5.446 million short tons

CHANGING TECHNOLOGY WILL INCREASE SOUTHERN HARDWOOD USE IN FUTURE

Technological advances influencing fiber shifts include improved paperboard processes, optimized fiber distribution, and press drying

By PETER INCE

Use of hardwood pulpwood in the U.S. has increased due to technological and economic changes. During the past 30 years, technological change doubled the ratio of hardwood in all pulpwood consumed in the U.S. as a whole. During the same period, economic change more than tripled the total consumption of all pulpwood in the U.S. and nearly quadrupled pulpwood consumption in the U.S. South. These shifts toward hardwood are likely to have an effect on products as well as stumpage prices and forest management opportunities.

HISTORY OF HARDWOOD CONSUMPTION. The history of hardwood pulpwood consumption in the U.S. is explained to a large extent by the morphological differences between hardwood and softwood fibrous materials. Papers made from softwood pulps generally have greater strength than similar papers made from hardwood pulps chiefly because the longer fibers in softwood have a greater capacity to bond to one another. However, delivered hardwood pulpwood is about 30% cheaper per cord than softwood in the South.

The use of pulpwood for papermaking began in the U.S. about 1860, when rags were still the major raw material. Poplar (aspen) was used in papermaking in New England, and it was by far the most common hardwood used in papermaking in the late 1800s. In 1899, poplar accounted for about 13% of all pulpwood consumed in the U.S., 76% was spruce and balsam fir, and the remainder was pine. By 1921, poplar had declined to less than 6% (by some accounts 3%), miscellaneous species matched that portion, and softwood use soared to 85%. In 1952, the data still had not changed a great deal, with hardwoods (all species) amounting to 14.4% of all pulpwood consumed in the U.S. and accounting for only 12.2% of pulpwood consumed in the South.

Since 1952, consistent annual data on hardwood and softwood pulpwood consumption in the South and in the entire U.S. have been kept. This permits an in-depth analysis of hardwood pulpwood consumption during the last several decades, including determination of the influence of new technology on consumption of hardwood pulp.

GATHERING DATA. Annual consumption of all pulpwood went from 26.5 million cords to 84.5 million cords in the U.S. and from 14.6 million cords to 55.1 million cords in the South from 1952 to 1983. If hardwood pulpwood in 1983 still accounted for only 14.4% of total U.S. consumption, and only 12.2% in the South, then hardwood consumption would only be 12.2 million cords in the U.S. and 6.7 million cords in the South. Hardwood pulpwood consumption would have been at those levels had there been no change in papermaking technology since 1952.

However, in 1983 hardwood pulpwood consumption reached 24 million cords in the U.S. overall and 15.2 million cords in the South. That represents 28.4% in the U.S. overall and 27.6% in the South. Figure 1 shows the annual pulpwood consumption from 1952 to 1983 for the U.S. and the South. The figure shows the difference between the two levels (no technological change and actual consumption). The increase in hardwood use is attributed to new technology.

To determine what caused this usage shift, it is necessary to identify the changes in the quantities of various grades of woodpulp produced. According to the American Paper Institute, six different grades of woodpulp exist, four softwood based and two hardwood based. No economic data show the actual amounts of hardwood and softwood used in producing these pulp grades. The softwood-based category includes sulfite, bleached and semibleached sulfate and soda, unbleached kraft, and thermomechanical groundwood pulps.

The hardwood-based category includes semichemical and bleached and semibleached sulfate and soda pulps. If the categories are appropriate, the historical increase in percent hardwood in pulpwood consumption would correlate with the trend in the production ratios of hardwood- and softwood-based pulps, which is precisely what is found.

Mr. Ince is a research forester with the U.S. Dept. of Agriculture's Forest Products Laboratory in Madison, Wis.

CORRELATING DATA. Figure 2 shows production trends of hardwood- and softwood-based pulps from 1952 to 1983 for the U.S. overall and from 1976 to 1983 for the South (earlier data for the South were not available). In the 30-year period, the ratio of hardwood-based pulps grew from 8.8% to 25.3% of all paper-grade pulp. This is very similar to the historical increase in the percent hardwood in pulpwood consumed in the U.S. Calculating the correlation coefficient between percent hardwood in pulpwood and percent hardwood-based pulps in the U.S. from 1952 to 1983 gives 0.979, indicating that percent hardwood in pulpwood consumption correlates almost perfectly with the trend in production of those grades of pulp categorized as hardwood based.

A statistical regression of percent hardwood in pulpwood on percent hardwood-based pulps and percent softwood-based pulps gives the following estimates for the U.S. from 1952 to 1983:

$HP_t =$	$0.793\ HBP_t$	+	$0.0904\ SBP_t$
Standard deviation	(0.0217)		(0.00539)
T-ratio	(36.5)		(16.8)

Durbin-Watson statistic = 0.50

where:

HP_t = Percent hardwood in pulpwood in year t

HBP_t = Percent hardwood-based pulp in all paper-grade pulp produced in year t

SBP_t = Percent softwood-based pulp in all paper-grade pulp produced in year t

t = years, 1952 to 1982

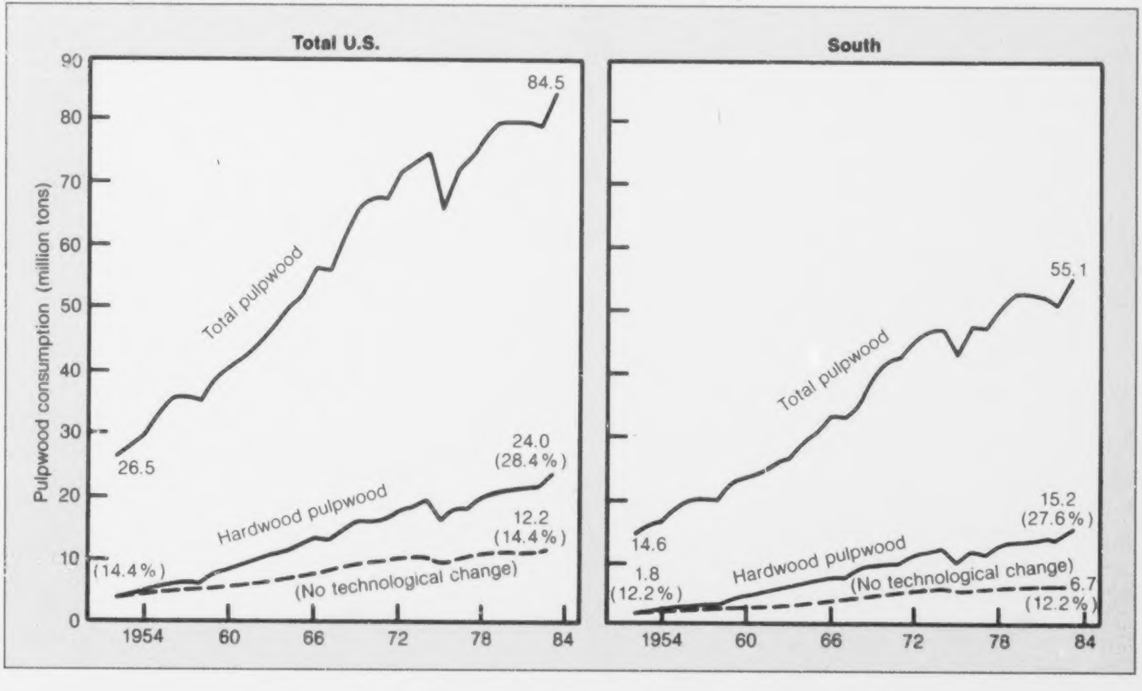
The regression equation provides excellent results and shows that percent hardwood in pulpwood is explained almost entirely by the percentages of hardwood- and softwood-based pulps produced in the U.S. each year. In other words, technological change in hardwood pulpwood consumption is explained by change in the ratio of the two pulps. The regression coefficient also suggests it is statistically plausible that about 79% of the hardwood-based pulp is hardwood fiber, while only 9% of softwood-based pulp is hardwood fiber.

The fitness of predicted values from the estimated regression equation gives a better appreciation of the results. Figure 3 shows a plot of actual percent hardwood in pulpwood consumed in the U.S. from 1952 to 1983. Superimposed on this graph is the predicted values from the equation for percent hardwood in the U.S. (30 years) and the South (six years).

The regression results have such a high fitness that it is unnecessary to look elsewhere for further explanation of the technological change in hardwood pulpwood consumption in the last 30 years. It is clear from the results that the ratio of hardwood in pulpwood is explained by the ratios of hardwood- and softwood-based pulps.

The increase in the ratio of hardwood-based pulp is probably due to both technological and economic reasons and is more difficult to explain. Technologically, the increased use of hardwood-based pulps is due to advances that have allowed greater use of such pulps in papermaking. It is common knowledge that technology

FIGURE 1: **Annual pulpwood consumption for the U.S. and the U.S. South (1952-83).**



has developed during the past 30 years to permit increased use of hardwood fiber in bleached pulps, printing and writing papers, and semichemical pulp used for corrugating medium. Economically, relative demand for those grades of paper that make use of hardwood-based pulps may have increased.

No technical or economic data on relative quantities of hardwood and softwood fiber in various grades of pulp and paper exists. More research should be done in this area. On the other hand, technology still constrains the use of hardwood fiber in softwood-based pulp grades such as unbleached sulfate and in paper grades such as kraft linerboard. Indeed, a correlation of the estimated regression equation with time (Figure 3) suggests that a stable relationship exists between the percent hardwood in pulpwood and the ratios of both hardwood- and softwood-based pulps.

The regression results and their stability over time make it plausible to say not only that 9% of the fiber used in softwood-based pulps is hardwood fiber, but also that this ratio has not changed much in 30 years. Furthermore, softwood-based pulps are still the major category of pulp produced in the South and in the U.S. overall (Figure 2). Clearly, an increase in the use of hardwood pulpwood can be achieved by increasing the use of hardwood fiber in softwood-based pulps.

SCIENTIFIC DEVELOPMENTS. New research has focused on ways to accommodate the use of more hardwood in kraft linerboard. Kraft linerboard consumes most of the unbleached kraft pulp in the U.S., and unbleached kraft pulp is the major grade of pulp in the softwood-based pulp category. In the South, 60% of all softwood-based pulp produced in 1982 was unbleached kraft pulp, and most of it was used in kraft linerboard.

Press drying is a new concept in papermaking and an exciting new idea for kraft linerboard and corrugating medium. In press drying, pressure and heat are simultaneously applied to the paper web. Press drying has a variety of positive effects on papermaking, including increasing strength and enabling hardwood use.

Vance Setterholm of the Forest Products Laboratory (FPL) recognized that with press drying it was possible to produce a high-strength linerboard sheet using 100% hardwood. Researchers at FPL discovered that press drying creates a much better and more stable chemical bond among the fibers. Press drying bonds fibers together in a far superior fashion than do conventional methods, and the bonding works especially well with hardwood fibers. Consequently, with press drying a strong linerboard can be made just as well, if not better, with hardwood raw material.

Press drying also offers major economic advantages in papermaking. Considering the abundance and relatively low market value of hardwood pulpwood in the South, it is natural to assume press drying will be adopted by the linerboard industry in the near future.

At the same time that new concepts in papermaking

FIGURE 2: **Annual production of hardwood- and softwood-based pulps (1952-83).**

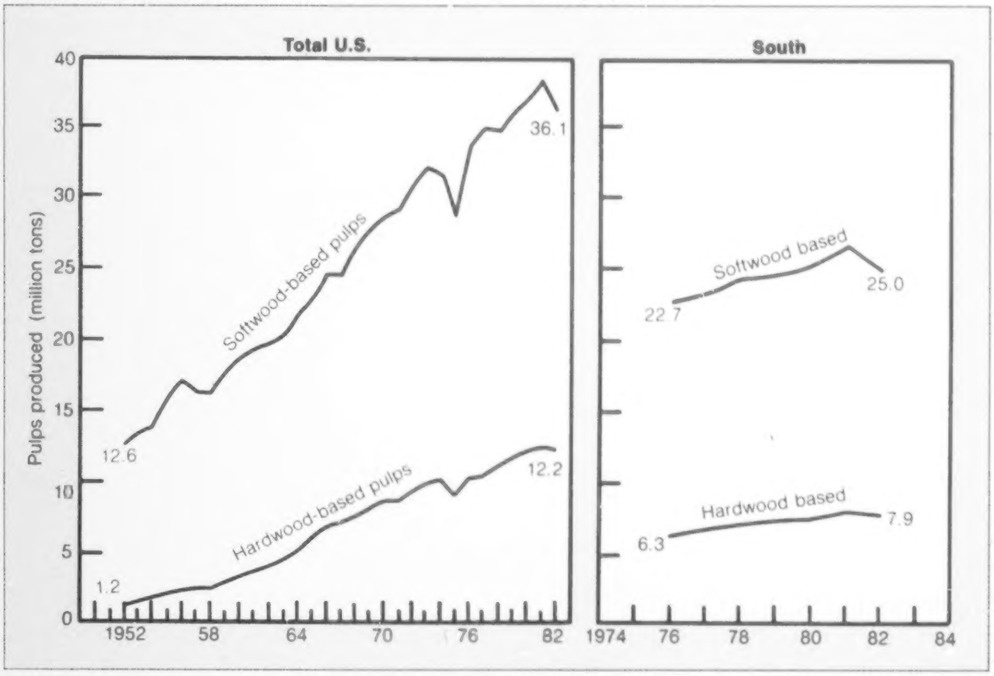


FIGURE 3: **Percent hardwood in pulpwood consumed in the U.S. (30 years) and the U.S. South (six years).**

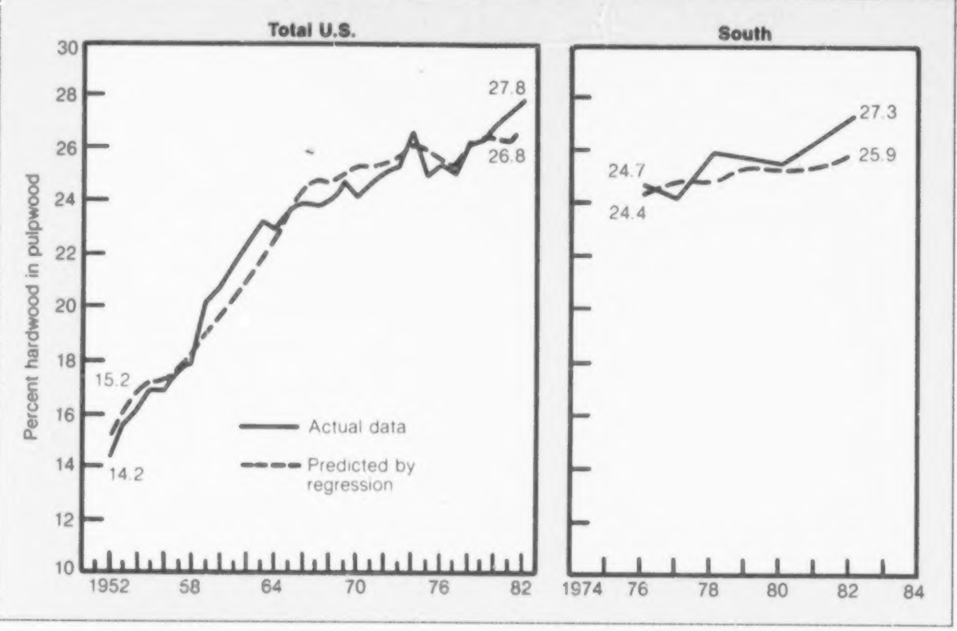


TABLE 1: **Projections of the percent hardwood-based and percent softwood-based pulp in all paper-grade pulp produced in the U.S. South and total pulpwood consumption of the year 2000, based on time trends in data from 1976-83.**

	Year	
	2000	**1982**
Hardwood-based pulp	30%	24%
Softwood-based pulp	70%	76%
Total pulpwood consumption*	**80.8 million cords**	**55.1 million cords**

*U.S. Forest Service data.

are being explored, improvements are being made in conventional paperboard processes that will also accommodate greater use of hardwood in pulpwood, including recent big improvements in fiber refining. Wet press design improvements have achieved longer residence time of the sheet in the press and higher pressures, resulting in higher sheet density. Equipment to achieve such high density is now installed in linerboard mills.

FPL research confirmed that a sheet made from southern red oak kraft pulp at high density can achieve the same burst, tensile, and compression strengths as a sheet made from southern pine kraft pulp. Another FPL project has shown that by separate refining of hardwood and softwood fibers, it is possible to use more than 50% hardwood fiber in conventional linerboard and achieve satisfactory compressive strength.

The last concern is fiber optimization in corrugated boxes. Modern shipping practices subject corrugated boxes to compressive loads. The primary concern in corrugated used to be the ability to resist rough handling, measured by the bursting strength of boxes. This occurred because boxes were often hand carried and passed through a labor-intensive shipping environment with a high likelihood of being dropped.

Today boxes have to withstand stacking and compression forces. Boxes are now being mechanically palletized, shipped, and handled in unitized stacks. Collapse due to inadequate compression resistance is the main hazard in this environment. Papermaking becomes more rational when it is aimed at improving box performance in terms of compression strength.

Research at FPL on optimizing fiber distribution in corrugated boxes quantifies the advantages of using compression strength as the criterion for producing corrugated boxes. Hardwood fiber in linerboard can overcome its low burst strength and compete with softwood according to a compression strength criterion, especially if the linerboard is produced using a process such as press drying. Although corrugated boxes are still produced according to the old burst test criterion, consumers increasingly demand compression strength tests, which will become the new criterion of the future. This has the potential to greatly increase the use of hardwood fiber in linerboard.

PROJECTIONS OF THE FUTURE. If by the year 2000 hardwood accounts for 50% of all fiber in softwood-based pulps produced in the South, this would, of course, change the historical formula for estimating percent hardwood in pulpwood consumed in the South. The historical formula is:

$$HP_t = 0.793\ HBP_t + 0.0904\ SBP_t$$

In other words, this suggests that hardwood-based pulp is 79% hardwood and softwood-based pulp is 9% hardwood. If 50% of softwood-based pulps were hardwood, the formula would become:

$$HP_t = 0.793\ HBP_t + 0.5\ SBP_t$$

The last equation provides a different technological alternative for looking ahead to the year 2000. The historical alternative is represented by the first equation, and new technology alternatives are contained in the second. The first alternative says the historical relationship between percent hardwood in pulpwood and pulp grades will remain the same. The second alternative states technological change will increase the ratio of hardwood fiber in softwood-based pulps. It should be noted that this does not consider timber prices or the effect of shifting timber supplies. It only considers the constraint on technological change.

Pulp-grade data for the year 2000 are obtained for this analysis by straight-line projection time trends since 1976. Projections are shown in Table 1. For 2000, it is projected that 30% of the pulp produced in the South will be in the hardwood-based pulp category, while 70% will be in the softwood-based pulp category. Pulpwood data for the year 2000 are obtained from the U.S. Forest Service Timber Analysis report (1982). Total pulpwood consumption for the South is projected at 80.8 million cords/year.

When the first equation is applied to the projected data, percent hardwood in pulpwood is projected at 30.1% of the total pulpwood consumed in the South in 2000. This closely agrees with the U.S. Forest Service report of 29.5%. Both projections suggest hardwood pulpwood consumption will be about 24 million cords at the close of the century. This is the level of hardwood pulpwood consumption forecast by historical trends in technology relationships for the South. When the second equation is applied to this data, percent hardwood in pulpwood is projected at 58.8% of total pulpwood consumption, or 47.5 million cords—about double the level projected by historical relationships.

It is at least technically feasible to suggest that 58% of the pulpwood consumed in the South could be hardwood by 2000. The historical trend in the U.S. is in the direction of greater hardwood use, particularly with regard to the scientific developments previously mentioned in traditionally softwood-based pulps. For comparison, in 1981 59% of the pulpwood consumed in Japan was hardwood, while 30 years ago only 10% of the pulpwood consumed in Japan was hardwood.

Note that none of the projections shown here, except for the U.S. Forest Service report, are econometric projections. The projections are not based on detailed analysis of timber supply constraints or market considerations. They focus only on the constraint of technology on hardwood use and on what might happen if that constraint is removed by new scientific developments. The projections do not purport to show precise future levels of estimated pulpwood consumption, but only show major impacts of new technology could occur in the future. More effort is needed to study and appreciate the proper magnitude of these impacts.

It has been suggested that new developments in pulp and paper science may change technology and increase the use of southern hardwoods, particularly in traditional softwood-based pulps such as unbleached kraft used in the production of linerboard. At the outside limit, it is conceivable that the use of hardwood fiber in softwood-based pulps could increase from the historical 9% to 50% or more. If such levels are reached by the year 2000, hardwood pulpwood consumption in the South could more than double the level projected by historical technological relationships. Results indicate that in any case hardwood pulpwood consumption will increase for the South in the future and may dramatically increase as a result of recent scientific developments.

ECONOMIC PAYOFFS. The payoff, in terms of forest management opportunities, can take several forms. First, there will be a payoff in terms of continued and increased removal of pulpwood-grade hardwood from the forests of the South. This may be a silvicultural benefit for the South if it means better use of lower-grade hardwoods. The projected increases in the volume of hardwood pulpwood consumed in the South could guarantee this payoff.

Second, stumpage values represent a potential payoff. Economic common sense would imply that as the demand for hardwood goes up, the value of hardwood stumpage will also increase. However, data examined for this report show no such effect for hardwood pulpwood in the South since 1976.

The data examined consisted of Timber Mart-South's monthly stumpage values for hardwood pulpwood in the Southeast and the American Pulpwood Assn.'s monthly data for hardwood pulpwood consumed in the Southeast. The monthly difference in hardwood pulpwood consumption was compared with the monthly difference in hardwood pulpwood stumpage value.

If hardwood pulpwood consumption affects stumpage value, some statistical correlation between the two sets of data should exist. No such correlation was found. The correlation coefficient was calculated at 0.017. Consequently, it is difficult to suggest statistically that increasing hardwood pulpwood consumption will increase hardwood pulpwood stumpage value in the South, although this hypothesis makes sense from an economic standpoint.

It would appear that a dominating supply-side influence on hardwood pulpwood stumpage value overrides any effect of demand changes. Perhaps an increase in hardwood growth or harvesting efficiency have offset the effect of increased consumption of hardwood pulpwood in the South. Nevertheless, stumpage value depends on many factors not specifically covered in this article.

Another potential effect of increased use of hardwood could be a dampening effect on the rise in softwood market value, which could be a benefit for the wood-using industry of the South. An understanding of these kinds of effects requires a much more detailed analysis than what is presented here. ■

AS PAPER INDUSTRY EMPLOYMENT FALLS, HIRING DEMOGRAPHICS ARE CHANGING

Mergers, consolidation, and recession have reduced employment opportunities despite increased production—trend likely to continue

By TRYG R. ANGELL

The years between 1979 and 1983, highlighted by back-to-back recessions, were turbulent ones for the pulp and paper industry. Particularly hard hit were the primary product producing sectors, whose operating conditions rivaled or exceeded those of the 1974-75 period in severity. As expected, these difficult operating conditions quickly reduced employment levels throughout the industry. In addition, the same period saw a number of mergers, consolidations, and restructurings that also reduced employment levels. The effect of these crosscurrents has not yet been fully reflected in employment statistics.

The North American industry saw substantial drop offs in employment for technical, professional, and sales employees, as well as the usual drop in production employment. In the 1979-83 period, total employment in the primary product sectors (pulp, paper, and paperboard) in the U.S. declined by 4.9%, and employment in production dropped by 5.6%. On a roughly comparable basis, the U.S. fared better than Canada, where total employment dropped 5.7%, and production employment fell by 7%. The absolute number of employees in each category is much smaller in Canada, but the personnel dislocations were more severe.

In Canada, the absolute lows in employment were registered in 1982, according to preliminary data from Statistics Canada. In the U.S., total employment continued to slip in 1983. However, production employment rose in that year, stemming a decline that had been continuous since 1980.

EFFECT OF RECESSION. After each recession, neither total employment nor production employment returned to previous levels during the ensuing recovery period. This trend has been in evidence since 1969, and there is no reason to expect that the current recovery will be any different. The restructuring under way in the industry can be expected to continue and to influence both the levels of employment and the type of employee in the foreseeable future. Table 1 traces the history of employment by type of employee for the primary product sector since 1979 and clearly shows the effect of the trends discussed.

What about the future, and what may be expected during the next two to three years? Total industry trends can sometimes be misleading since they tend to mask some of the more subtle crosscurrents and shifts.

An examination of a small but highly important sector of the industry can be revealing. The chemical paper-grade market pulp segment of the industry serves as a very good proxy for the general health of the whole industry, both in the U.S. and abroad. It reflects demand from domestic mills, both integrated and nonintegrated, as well as export demand from abroad.

An indication of the responsiveness of this relatively small sector to changes in the industry is seen in the shipment history of 1983 and 1984. In 1983 U.S. chemical paper-grade market pulp shipments were 4.8 million metric tons, up about 7% over the depressed levels of 1982. In 1984, shipments rose to 4.96 million metric tons, a 3% increase. In each year, export demand counted for slightly more than one half of the total. However, the export percentage dropped slightly in 1984, partly in response to strong domestic demand—in part as a result of strong operating rates at printing paper mills—and partly as a result of a labor dispute in Canada that reduced or disrupted normal supply sources.

This sector represents about 10% of U.S. paper-grade pulp production. What did this recovery in the pulp sector, driven by the strong markets for printing paper grades, do for employment? Regrettably, it didn't do much, at least in so far as preliminary data show.

Table 2 shows what has happened in respect to both total employment and production employment in the pulp industry since 1977. That year is a point in the last business cycle roughly comparable to 1983 in the current cycle. For this level of industry detail, only preliminary estimates, sketchy and subject to considerable revision, are available. The data show only small changes in the employment picture. It should be kept in mind that one more mill was operating in 1984 than 1983.

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The best comparisons may be made between 1977 and 1982. Both are Census of Manufacturers' years, and therefore avoid the sample errors inherent in the Annual Survey data. While data for the intermediate years do show, with some error, the ups and downs related to the recession and to strikes, a trend may be extracted between these two points. It is clear that the compound annual growth rates are low— well below the rate of growth of the economy—and certainly well below the rate of growth of either output or capacity. However, the pulp sector is doing a bit better than the industry as a whole, where actual *declines* in employment are prevalent in many sectors. Also, it is important to remember that chemical market pulp capacity increased 45% between 1977 and 1982.

FUTURE EMPLOYMENT OPPORTUNITES. The rest of this article will explore what the events of the last five years suggest for the future as well as the implications for professional, technical, and marketing employment. This will be done based on my professional recruiting experience in these disciplines in both the U.S. and Canada. While the data discussed earlier are illuminating, a qualitative viewpoint, based on the industry's recruiting efforts, can be even more revealing.

It is clear that the industry will continue to expand, particularly in the U.S. South. What is not clear is that it will be able to hold its position as the world's low-cost fiber producer. It has long been regarded as an article of faith that the U.S. South was the world's lowest-cost fiber producer and that the U.S. enjoyed a comparative advantage with respect to pulp production. The strength of the dollar, plus strategic currency devaluations on the part of Scandinavians, calls this into question. The world pulp market is denominated in U.S. dollars; offshore producers' costs are in their own currencies.

"Productivity" is a popular catch phrase today and is offered as a panacea for the ills of any industry. From the data already presented, it is clear that the pulp sector has had its share of productivity improvement. This is especially evident in the professional, technical, and sales areas. The large increases in output and the shifts in market conditions have been handled with only small increases in head count. If this level of efficiency is to be maintained, what kinds of people will be needed and where will they come from?

First, it is clear from the search assignments I receive that "quality" and "selectivity" are of prime importance. While clients are more selective, particularly for management and sales, the pool of talent from which to draw is relatively static in size. It seems that a process of natural selection is at work here; individuals do emerge over time, but more by their own innate capabilities than through an active, managed development process.

The track record—and the way it is accomplished—is important. People skills have become more important, and educational breadth rather than technical content is looked at more closely.

Second, the pulp industry employs something less than 3% of the "nonproduction" workers in the entire industry. When the technical and supervisory workers are netted out, a rather small cadre of sales, marketing, and managerial personnel are left. The industry has not been known for its efforts to formally develop its sales and professional people for higher-level responsibilities or to expand the pools of talent from which it draws. In this, the pulp sector is not unlike other sectors of the industry—a certain "compartmentalization" exists in that it is very difficult to move from one part of the industry to another. Experience is a bit "inbred."

SKILLS DEVELOPMENT INBRED. Training programs abound in the industry, mostly at the entry level, with some available in sales effectiveness and sales management techniques for new sales managers and periodic updatings for the seasoned sales professional. The most common technique for developing senior management talent seems to be informal "mentoring." This is a problem for talented individuals without the opportunity to be seen by the senior managers who are mentors. This does not necessarily reflect upon the individual; the per-

TABLE 1: **Employment in the U.S. primary product sectors, pulp, paper (including building paper), and paperboard.**

Year	Total employment (000)	Production workers (000)	Other* (000)
1979	271.4	206.6	64.8
1980	268.4	203.2	65.2
1981	267.3	203.0	64.3
1982	258.9	195.7	63.2
1983	258.2	195.0	63.2
1984	264.0	199.6	64.4

*Administration, technical, sales.
Source: American Paper Institute. Statistics of paper—1985, Bureau of Labor Statistics, "Employment & Earnings."

TABLE 2: **Employment in U.S. pulp mills, 1977-83.**

	1983[1]	1982[2]	1977	Percent change (1983–82)	Compound annual growth (1977–82)
Total employees (000)	16.7	16.7	16.2	0	0.6%
Production workers (000)	12.9	12.8	12.5	<1.0%	12.5
Administrative, technical, and sales employees (000)	3.8	3.9	3.7	−2.6%	3.7
Payroll ($ million)	n.a.	467.9	293.2	n.a.	9.8%
Wages ($ million)	n.a.	345.1	220.5	n.a.	9.4%

n.a. = Not available.
Sources: 1. Bureau of Economic Analysis.
2. U.S. Bureau of the Census.

son may be in a position not traditionally regarded as suitable for advancement to senior management.

An example of this may is found in women in the industry. While saleswomen have been a fixture in the distribution sector of the business for some time and have gained acceptance in the converted product sectors, some even achieving sales management levels, they have only a small representation in the primary product sectors. Women chemical engineers have been an increasing part of the work force for some time. Women are found in more staff functions in the industry but rarely found in marketing, sales, or management.

Search specifications continue to bear this out. The sales and marketing areas are the places in the industry that have a good track record into executive ranks, to say nothing of the opportunities for high compensation.

The demographics of the work force are changing in quantity, quality, and gender. At the same time, the employment profile of the pulp and paper industry has remained relatively constant. The industry must meet the complex challenges that it faces today: increased competition in world markets and the need to maintain and enhance productivity at all levels. If it is to attract the high skill levels needed to meet these challenges, it must expand the pool of talent from which it draws. As women become a larger part of the total work force (which they will do), it is important that they become better integrated at all levels, including operations. This means they must be accepted in nontraditional roles.

RE-EXAMINE ATTITUDES. To accomplish this, certain things must happen. First is a re-examination of the attitudes of management in this male-dominated business. Many women in the industry question how serious management really is about career development for women. Management apparently doubts the commitment women have to their careers. Women perceive a reluctance by management to consider them as serious candidates. This can be the most difficult perception of all to overcome. One way to at least begin to improve the situation is for senior management to set goals for getting women into line jobs and to make women's accomplishments a part of the performance criteria of the line managers. This requires a flexibility of thinking that has, so far, been exhibited by few companies.

Communications need to be opened so that women interested in advancement can make their decisions known to the level of management that can help them, not just to the human resources people. A real two-way dialogue has to exist, not just pronouncements from on high with no tangible evidence of commitment.

Obviously, such steps would introduce some very different individuals into management ranks and perhaps elevate the discomfort level of the incumbents. However, change to accommodate developing circumstances is as important in recruiting and management development as it is in the production part of the business. ■

GASPESIA PULP MILL UPS YIELD

(Continued from page 119)

The designed capacity of the chemimechanical pulp mill—235 short tpd—has been reached. The new plant's instrumentation and controls are operated through a Foxboro Videospec system, which makes the operation of the plant possible with only two people per shift.

ELIMINATING CHEMICAL PULP. Table 1 presents a comparison of pulp properties for the type of chemimechanical and sulfite pulp produced at Chandler. Newsprint quality changes before and after the new pulp was introduced into the furnish are shown in Table 2.

Total replacement of chemical pulp in the newsprint furnish has not been successful as yet, but the percentage made up by sulfite has been reduced from 25% to 10%, with chemimechanical at around 25%. The experience at Chandler has been typical of that at other newsprint mills seeking total replacement of chemical pulp with chemimechanical pulp from cooked chips—all have difficulties eliminating the use of chemical pulp.

The major difficulty with the new process has been the presence of sufficient pitch in the pulp to seriously affect paper machine runability. This has been brought under control, and the mill is optimistic about eventual total replacement of sulfite pulp in the furnish. ■

TABLE 1: **Comparison of pulp properties.**

	Bisulfite chemimechanical	Low yield sulfite
Freeness	415	690
Tensile	7.0	8.5
Burst index	4.0	5.5
Tear index	8.3	8.8
Percent stretch	2.0	2.3
Wet breaking length	340	500
Percent o.d.	42	45
Percent stretch	3.7	4.7
Brightness (Elrepho)	55	59
Opacity	91	90

TABLE 2: **Newsprint quality, No. 1 machine.**

	Before new pulp	After new pulp
Caliper	0.072	0.075
Tear		
CD	244	236 — 3%
MD	169	155 — 10%
PPS (S-10)		
Felt	2.89	3.33
Wire	3.07	3.50
Printing opacity	95.2%	94.0%
Tensile	25.0	24.9
Formation NUI	8.0	8.4
Headbox coins	0.69	0.72
Mixed stock freeness	181	162

Industry performance study

A new report, ***Financial Performance of Forest Based Industry*** in 1975-84/85, from Jaakko Pöyry, is a study of 163 major companies producing pulp, paper, and wood products in 12 western European and North American countries. Presented are detailed statements and calculations of earnings, balance sheets and sources, and applications of funds for each company reviewed. The study also gives information on product mix and the general economic environment in each country. The study includes solid wood products, pulping, and papermaking capacities; concise market reviews for solid wood products, pulp, and paper; cost competitiveness by region; and economic development by country. Financial performance of major producers in 1980-84 is given by product segments, covering newsprint, tissue, fine papers, packaging, market pulp, and building products. The data are compiled into four reports, including the Executive Summary, which lists background data on all companies analyzed in the study, and Basic Company Data, which is presented in three separate reports for North America, Scandinavia, and western Europe. Prices: Executive Summary, $750, $200 for each additional copy; Basic Company Data, $500 per report. Write: Jaakko Pöyry, Box 16, SF-00441 Helsinki, Finland.

Natural convection

A new 1,181-page book, ***Natural Convection: Fundamentals and Applications***, edited by S. Kakac, W. Aung, and R. Viskanta, discusses the information presented at an international forum designed to aid future progress in the field of natural convection. The forum was held by a NATO Advanced Study Institute (ASI) July 16-27, 1984. Topics covered include external boundary layer flows, plane layers, enclosure flow including tube bundles, turbulence modeling, mixed convection, stratified fluids, thermal plumes, natural convection in porous media, influence of temperature-dependent properties, numerical and experimental methods, natural convection in melting and solidification, natural convection/radiation interaction, and various applications and unresolved problems in natural convection. Price: $125. Write: Hemisphere Publishing, 1010 Vermont Ave. N.W., Washington, D.C. 20005.

Hydraulic valve standard

NFPA Recommended Standard Hydraulic Fluid Power Valves—Mounting Interfaces is a newly published standard from the National Fluid Power Assn. (NFPA). It gives the dimensions and general criteria for the mounting surfaces of nine types of hydraulic valves. The document provides graphic symbols, 31 figures, and 31 tables to help ensure interchangeability of directional, flow, and pressure control valves; check and pilot-operated check valves; and sequence, throttle, unloading, and pressure relief valves. Price: $25. Contact: National Fluid Power Assn., 3333 N. Mayfair Rd., Milwaukee, Wis. 53222.

Industrial evaporators

Industrial Evaporators, by Eli Nisenfeld, is a 280-page book providing a basic explanation of the principles of the unit operation of evaporation and the various types of evaporators and commonly used associated equipment. The critical operating and control parameters and variables on stability and economics are also presented. The book discusses basic instrumentation of evaporators and presents the pros and cons of various approaches to controlling evaporators. Development of procedures and mathematical models for control evaporators is also detailed. Price: $28 for ISA members, $34.95 for nonmembers. Write: Instrument Society of America, Publications Dept., 67 Alexander Dr., P.O. Box 12277, Research Triangle Park, N.C. 27709.

Steam systems

Nomograms for Steam Generation and Utilization, by V. Ganapathy, is a 175-page compilation of charts designed to simplify design calculations and estimates for all phases of steam systems. More than 70 nomograms are presented, each including a brief synopsis of theory and nomenclature and an example demonstrating use of the chart. The nomograms make it possible to study the effects of any variable by moving a straightedge. The book is organized into chapters covering fuels, combustion, heat transfer, steam generation and usage, valves, piping, and fluid flow. Sample problems using life cycle costing show how to arrive at optimum designs. Price: $32. Write: Fairmount Press, P.O. Box 14227, Atlanta, Ga. 30324.

Corrosion resistance

Corrosion Resistant Materials Handbook, edited by D.J. De Renzo, provides information on choosing commercially available corrosion-resistant materials for particular applications. Materials covered include synthetic resins and polymers; rubbers and elastomers; cements, mortars, and asphalts; ferrous alloys; nonferrous metals and alloys; and glass, ceramics, and carbon-graphite. A corrosive material index organized by chemicals and other corrosive substances, a trade name index, and a company and address listing are also included. A section containing 13 tables compares the anticorrosive merits of commercial engineering and construction materials. Price: $125. Write: Noyes Publications, Mill Rd. at Grand Ave., Park Ridge, N.J. 07656.

Efficient boiler operations

Efficient Boiler Operations Sourcebook, by F. William Payne, is a 221-page application-oriented book written to help operators and supervisory personnel improve boiler efficiency. It covers specific methods and assesses potential cost savings. A financial evaluation procedure used for determining the cost-effectiveness of boiler auxiliary equipment is presented. Other features include boiler efficiency calculation methods, testing and flame evaluation techniques, and guidelines for establishing a comprehensive boiler maintenance program. Various equipment available to improve boiler efficiency—including air preheaters, firetube turbulators, economizers, heat recovery systems, combustion control systems, and O_2 trim control—is discussed and evaluated. Price: $36. Contact: Fairmont Press, Box 14227, Atlanta, Ga. 30324.

Correction

In a recent article entitled "Use of cornstarch in papermaking is changing with new technology" (*P&P*, Dec. 1985, p. 83), an error was made in the listing for National Starch & Chemical Corp. in Figure 4, on p. 85. The listing for the company should have read: 1,250 million lb, with plants in Indianapolis, Ind. (750 million lb) and North Kansas City, Mo. (500 million lb).

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS. 500 Howard St., San Francisco. Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER. 500 Howard St., San Francisco. Calif. 94105.

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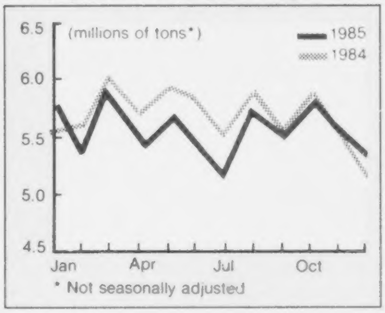
MONTH IN STATISTICS

U.S. paper and board production



* Not seasonally adjusted

U.S. production of paper and paperboard totaled 5.4 million tons in December 1985, up a sharp 4.3% from the previous year, the American Paper Institute said. The strong December performance pushed production for the year to 67.2 million tons, only 1.8% below the record 1984 total, and promised a strong start for 1986. Paperboard production totaled 33.2 million tons for the year, off 2.5% from 1984 because of weaker linerboard exports. Paper production totaled 34.0 million tons, down 1.2% due to weaker demand in most segments.

Among major grades, uncoated freesheet finished the year strongly, but tissue and recycled paperboard were the only other grades above their 1984 levels. Coated and packaging papers were weakest. Corrugated box shipments dropped 1.3% in 1985, while containerboard inventories on Dec. 1 were down another 5.1%. Kraft linerboard production for export continued to strengthen in December but was still down 15.9% for the year.

Canadian newsprint shipments finished the year at 9.0 million tons, down 0.3% from 1984. December operating rates slipped to 87%. Pulp shipments totaled 7.0 million tons, up 4.6%, with operating rates dropping to 79% in December. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Dec.	437	1.9	5427	−2.0
Uncoated groundwood (s)	Dec.	117	1.7	1502	−4.0
Coated paper (s)	Dec.	446	−10.4	5861	−6.2
Uncoated free sheet (s)	Dec.	799	15.0	9722	5.6
Other printing/writing	Dec.	111	0.9	1342	−8.1
Total packaging and other paper (s)	Dec.	410	6.2	5210	−6.2
Tissue	Dec.	402	−4.3	4941	0.4
Total paper	**Dec.**	**2721**	**2.6**	**34004**	**−1.2**
Unbleached kraft paperboard	Dec.	1315	6.8	16433	−4.3
Semichemical medium	Dec.	414	5.6	5084	−1.6
Bleached paperboard	Dec.	330	8.2	3972	−1.9
Recycled paperboard	Dec.	598	4.0	7701	0.8
Total paperboard	**Dec.**	**2656**	**6.1**	**33190**	**−2.5**
Total U.S. paper and paperboard output	**Dec.**	**5377**	**4.3**	**67195**	**−1.8**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Nov.	4521	0.4	54260	−2.9
Market pulp production	Nov.	585	1.0	6823	−1.4
Wastepaper consumption at paper/board mills	Nov.	1287	−1.8	15269	−3.5
Pulpwood consumption (cords)	Nov.	7112	−.6	86004	−2.4
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Dec.	17.217	−11.7	264.100[6]	−1.3
Containerboard inventories at U.S. box plants and mills	Dec. 1	2469	−5.1		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Nov.	916	0.8	11145	4.7
Imports of Canadian newsprint	Nov.	668	2.9	8130[6]	5.6
U.S. paper exports (including products)	Nov.	323	8.0	4011	−8.3
Exports of unbleached kraft linerboard	Dec.	156	23.8	1756	−15.9
Exports of woodpulp	Nov.	363	32.5	3816	6.6
Norscan pulp inventories[4]	Dec. 31	1298	−20.3		
Norscan pulp operating rates[4]	Dec.	75%	92%	86%	91%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Dec.	781	1.2	8992[6]	−.3
Operating rates	Dec.	87%	92%	92%	92%
Inventories held by U.S. consumers	Dec. 31	1378	2.7		
Other paper/board shipments	Dec.	237	7.7	3055	10.8
Woodpulp shipments (export only)	Dec.	629	6.6	7009[6]	4.6
Operating rates	Dec.	79%	82%	87%	87%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

COATED FREE-SHEET: Modest growth seen

Grade structure: The coated free-sheet group consists of papers made from no more than 10% groundwood pulp; the balance is chemical pulp. Coated Nos. 1 and 2, at the top of the quality range, have no groundwood content at all, while Nos. 3 and 4 may contain none, or small amounts only. About half of the No. 4 group, however, is excluded from the free-sheet category because of groundwood pulp content.

Basis weights for Nos. 1 and 2 are generally between 60 lb and 100 lb, while Nos. 3 and 4 are generally in the 45-to-90-lb area. Most coated free-sheet is used by commercial printers. The largest end uses are annual reports, catalogs, and other advertising and promotional materials. However, there are a few other important purchaser groups: about 10% of No. 3 goes to magazines.

Coated paper comes in glossy, dull, matte, and embossed finishes. Measurements of these finishes (Gardner gloss meter) are 45 or more for glossy, as low as 25 for dull, and 20 or below for matte.

One survey in the early 1980s estimated that about 65% of all No. 1 was glossy and 35% was dull, with a very small share for matte and embossed. For No. 2, about 80% was glossy and 16% was dull. For No. 3, it was 63% glossy, 3% dull, and 33% matte. Embossed represents less than 2% of any grade. Most of the 385,000 tpy of coated one-side paper (C1S) is free-sheet.

Production/capacity: Output of U.S. mills dropped in 1985, led by a fairly considerable decline in the No. 3 area. This was in marked contrast to the previous year, when production jumped at a double-digit pace. With capacity rising by only about 0.9% in 1985, the operating rate for the year remained at a fairly healthy 92.0% despite the drop in production.

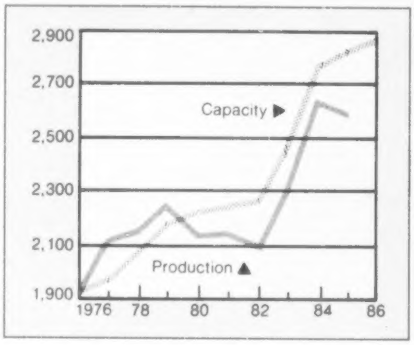
Westvaco Corp. was scheduled to add about 30,000 tons of capacity at Luke, Md., in 1985, and again in 1986, as part of an ongoing program to increase capacity by about 150,000 tons by 1989. The big news this year will be the startup by year-end of a new 215,000-tpy machine at Scott Paper Co.'s Hinckley, Maine, mill.

Outlook: Coated free-sheet mills were enjoying their usual good first quarter, pushed along mainly by annual report printing, but their business has suffered in recent months from the same customer inventory reduction that has troubled coated groundwood producers. This was expected to run its course by the end of the first period, setting the stage for slow but steady demand growth through the end of the year. This will be helped by anticipated strength in catalogs and in other retail-oriented printing during the second half.

Prices: Moderate discounts began to appear during the second half of last year, mainly in the No. 3 coated area. Inexpensive imports did appear in the higher grades, but that did not seem to undermine domestic mills' price structures. List prices last rose during the fourth quarter of 1984 but show no signs of increasing in 1986. Typical pricing trends ($/short ton, average price for year) are as follows for 70-lb No. 1 sheets: 1978, $880; 1979, $939; 1980, $1,021; 1981, $1,096; 1982, $1,148; 1983, $1,213; 1984, $1,321; 1985, $1,375. For 60-lb No. 3 rolls: 1978, $621; 1979, $690; 1980, $750; 1981, $798; 1982, $798; 1983, $830; 1984, $919; 1985, $980.

Markets: Most production of coated two-side (C2S) paper is shipped to commercial printers while C1S is generally used for label conversion. Percentages of C2S shipped to commercial printers, by grade, are estimated to be: No. 1, 98%; No. 2, 93%; and No. 3, 76%. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

	1984	1985	1986e
Production[1]	2,607	2,590	2,688
Capacity[2]	2,791	2,815	2,868
Utilization rate	93.4%	92.0%	93.7%
Imports	86	103	100
Exports	41	39	41
Apparent U.S. consumption	2,652	2,654	2,747
lb/capita	22.52	22.32	22.88
GNP ratio	1.62	1.58	1.59

e = Estimate.

1. *P & P* estimate.

2. API capacity survey.

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity	Market share (%)
1. Scott Paper[1]	525	18.3
2. Westvaco	470	16.4
3. Mead Corp.	377	13.1
4. Champion Intl.	365	12.7
5. Consolidated	205	7.1
6. Potlatch[2]	170	5.9
7. Midtec	150	5.2
8. Newton Falls	100	3.5
9. Simpson	90	3.1
10. Boise Cascade	72	2.5

Market share of top five companies:
67.7%

Market share of top ten companies:
88.0%

Total U.S. capacity (1986):
2.868 million short tons

1. S.D. Warren Div.

2. Northwest Div.

CONVERTED PRODUCTS

3M files suit against Ampad over sticky notepads

3M Co., whose Post-it notepads have dominated the $200-million U.S. market for self-adhesive notes, filed suit last December against Ampad Corp. of Holyoke, Mass., with the allegation that Ampad's Clingers notepads use technology on which 3M owns a patent. In a local newspaper report, an Ampad spokesman said, "We feel very strongly that we have not violated any patent laws and are prepared to prove it to them."

Since introduction of the Clingers pads in April 1985, the product has been responsible for a growing portion of overall company sales, said an Ampad spokesman. Avery International and Rediform also self-adhesive notepads, but 3M is considered the major competitor. ■

P&G is taking Ultra Pampers nationwide this year

Procter & Gamble plans a nationwide rollout this year of its Ultra Pampers disposable baby diaper containing superabsorbents. The diaper was test marketed last year in five midwestern states following its initial introduction in Wichita, Kans., in late 1984 (*P&P*, Jan. 1985, p. 33).

That will add a third national brand to P&G's line, which now includes New Pampers and a redesigned Luvs diaper. All three diapers will sell for about the same price.

Both versions of Pampers can be made on high-speed equipment that P&G installed last year as part of a $500-million program to reverse its declining market share. New Pampers, featuring a waist shield and extra fluff pulp, came on the market in early 1985.

Ultra Pampers has a superabsorbent core which can reportedly absorb 70 to 80 times its own weight. The estimated 3 to 5 g of polyacrylate powder in the diaper permits a decreased use of fluff pulp, which in the initial P&G prototype diaper is reduced by some 20 g/unit, according to *Nonwovens Markets* newsletter.

If the new, thinner diaper catches on with consumers, the growth rate for fluff pulp consumption could be reduced. So far, however, Kimberly-Clark Corp., the second-largest U.S. diaper manufacturer, has not even test marketed a superabsorbent baby diaper, although K-C has used the material in other products.

"Kimberly-Clark made the decision that superabsorbents in baby diapers would be an evolutionary, rather than a revolutionary, proposition," remarked Bruce Kirk of Goldman, Sachs & Co.

Rather, the company has been introducing an "extra absorbent" Huggies diaper which features increased use of fluff pulp and an elastic waist band. The company hopes to start producing the new version of its diaper by this month. ■

Scoreboard of ongoing battle for the disposable diaper market.

	Procter & Gamble				
	Total	Pampers	Luvs	Kimberly-Clark	Others & private label
1980	70%	59%	11%	9%	21%
1981	69	52	17	12	19
1982	66	48	18	12	22
1983	60	42	18	19	21
1984	54	34	20	25	21
1985e	47	28	18	33	21
1986e	47	30	17	33	20
1987e	45	30	15	35	20

e = Estimate.
Source: Goldman, Sachs & Co.

NEWSPRINT

K-C to rebuild newsprint machine at Coosa Pines

Kimberly-Clark Corp. is spending almost $17 million on modernization projects at its Coosa Pines, Ala., mill, including a rebuild of No. 3 machine and installation of a computerized roll management system.

Startup following the completed rebuild is scheduled for sometime in early 1987, with the major phases of the installation occurring during the holiday maintenance shutdown in December.

A company official said that engineering work is now underway for a wet end rebuild and installation of a top-wire former on No. 3 paper machine. The rebuild includes installation of a hydraulic headbox in order to improve sheet formation and basis weight uniformity. Sanford B. Pinkerton, president, U.S. pulp and newsprint, said that the project will also include a manual off-machine slice control, deaeration system, and five-stage stock cleaning system.

"Many of our customers have converted to offset or are in the process of converting from letterpress to offset, increasing their need for paper with improved printing characteristics and strength," Pinkerton noted. He explained that the proposed expansion project is part of K-C's plans to "keep pace with the changing requirements of the industry."

Market sources report that the company is also planning on installing a top-former on machine No. 4 in the near future. Both of the units are 336-in.-wide machines with capacity rated at approximately 120,000 metric tpy; both machines were installed in the late 1960s. ■

Planning moves ahead on Richmond newsprint mill

Planning for a possible 160,000-metric-tpy recycled newsprint mill to be built in the San Francisco Bay Area community of Richmond, Calif., is moving ahead, city officials report. A feasibility study of the $186-million

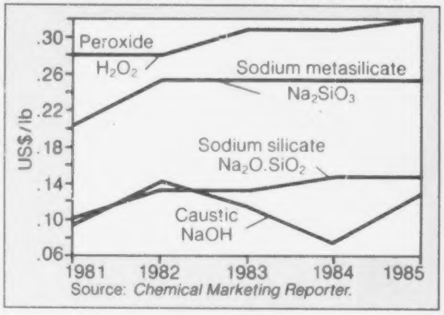
Recycling chemical use determined by equipment, market

Consumption. The overall demand for chemicals used to process wastepaper did not vary much between 1984 and 1985, due to the improved availability of higher quality wastepaper and a flat production year for deinked pulp and paper. The price of market pulp (which will remain low in the first quarter of 1986) and lower utilization rates in U.S. mills caused by an increase in imports are the major factors affecting domestic wastepaper consumption, which was off about 5%. Exports in 1985 held on and equaled those in 1984, thanks to a strong push in the last two quarters. Domestic demand and chemical use in 1986 should remain stable as the factors mentioned above improve, assisted by three new deinking operations and expansions at two others (totaling more than 500 tpd). Also, two other wastepaper plants opening in the U.S. will be adding close to 200,000 tpy.

The chief chemicals used in wastepaper processing appear in Table 1. Most wastepaper users do not use elaborate chemical inputs, especially when the color of the end product is insignificant. However, many users apply small amounts of caustic and detergents for alkalinity and dirt removal. For deinking, chemical application is becoming more important for quality-conscious manufacturers. Hydrogen peroxide, for example, is becoming a more popular additive to pulpers, particularly when paper containing mechanical pulp is the raw material. Peroxide attacks the ink binder and assists in making the binder water soluble. Teaming with peroxide in many systems are silicates, used for peroxide stabilization and curtailing brightness reversion. These two chemicals prevent darkening and yellowing of mechanical pulp in the furnish and help to whiten pulp by three to eight points.

Efficiency of ink removal is also increased, reducing cooking times (and steam costs) and pushing up capacity. Silicates have been said to cause scaling problems, but supplier research has shown that this is not true in most cases. Surfactants have grown in use to avoid "stickies" and to control pitch, charge aversion, and water hardness. As reported last year, dealers of surfactants, deformers, and detergents are supplying mills with computerized formula (using mill equipment, wastepaper grade input, and end product data) that apply to individual needs. Equipment manufacturers are also recommending certain formulas to aid in production when operating with their deinking systems.

FIGURE 1: **Recycling chemicals price history.**



Source: *Chemical Marketing Reporter.*

TABLE 1: **1985 consumption (short tons).**

	Recycling	All pulp and paper	All industry
Caustic	12,000	2,100,000	11,750,000
Silicates	11,500	13,000	750,000
Peroxides	5,100	18,000	8,700,000
Surfactants	7,050	—	—

Price. There will be an ample supply of chemicals for wastepaper processing during the coming year, and the cost of the chemicals does not appear to be moving upward. A possible exception may perhaps occur with regard to caustic, since the chloralkali market as a whole improved at the end of 1985 with a price increase for chlorine, coupled with improving housing starts, car production, and other factors that influence demand. Should those favorable economic conditions be realized during the first quarter, prices for caustic could reach or perhaps surpass 1982 levels.

Peroxide has had moderate price boosts throughout the 1980s (Figure 1), which will probably continue until new capacity reaches the market in the latter part of the decade. A major silicates supplier mentioned that its customers could see prices increase with inflation, but no considerable jumps are seen for 1986. Surfactant costs vary with supplier and formula, and incremental price increases are expected during the year. It should be noted that severe discounting occurred last year in all facets of the paper industry (chemical purchases included), and if the same economic conditions prevail this year (strong U.S. dollar, etc.), discounting could make list prices quoted here meaningless. ■

FIRST QUARTER SIGNALS RISING TREND IN WASTEPAPER MARKETS THIS YEAR

Dwindling supplies and rising export demand indicate strengthening secondary fiber markets—and possible price rises in second-half 1986

By DEBRA A. ADAMS, Senior News Editor

Wastepaper markets appeared to be starting a trend upward early in the first quarter of 1986, with some high- and low-grade prices moving up slightly—the first real price rises in more than a year in some areas.

Other signs also seemed to point to improving market conditions. Supplies were getting tighter in such grades as old corrugated containers, new double-lined kraft corrugated clippings, and some of the hard whites such as hard white shavings and hard white envelope cuttings. Prices in these grades rose slightly in some areas of the U.S. and appeared to be on the verge of a hike in other regions.

Export activity was also providing momentum for wastepaper markets, with offshore demand for such grades as corrugated, news, and some pulp substitutes putting a strain on dwindling domestic supplies, industry observers reported.

Overseas consumption of U.S. paperstock this year is expected to be at least as high as it was in 1985, which is projected to end at a level slightly above 1984's record of 3.235 million short tons. For the first 11 months of 1985, exports were 1.0% ahead of the same period a year earlier, according to recent U.S. Dept. of Commerce figures compiled by the National Assn. of Recycling Industries (NARI).

U.S. paperstock shipments to some of the traditionally large foreign consumers were down slightly last year, while orders to many countries with normally lower consumption levels increased substantially. The big loss was in commerce with Canada, where consumption of U.S. secondary fiber was down nearly 37% through November 1985. And according to Daniel F. O'Connor, sales manager for Wray Fibres International Inc. of Buffalo, N.Y., Canada's requirements from the U.S. are not expected to improve in 1986 due to Canada's stepped up recycling efforts.

SOME GOOD EXPORT MARKETS. In Mexico, India, People's Rep. China, and the Pacific Rim countries, however, demand is expected to remain robust in 1986 due to limited availability of recyclable paper in these markets.

Mexico, for instance, has grown to rely heavily on U.S. paperstock imports. According to the latest statistics available, Mexican consumption rose to 22% of the total secondary fiber used in that country in 1978 compared with just 8% in 1975, according to Martin A. Cordoves of Western Pulp & Paper Inc.

Within the U.S., however, wastepaper consumption has not grown as markedly. The utilization rate—the ratio of recyclable paper consumption to total production of paper and board—has remained at about 23% for more than a decade. During the first ten months of 1985, total wastepaper used in domestic mills was running at an annual rate of 15.223 million tons—down nearly 4% from a year earlier.

U.S. mill demand for secondary fiber is expected to be higher this year than it was in 1985 due to a better outlook for the paper industry in general. Overall production, operating rates, and profits are expected to rise notably this year.

Interest rates are projected to stay low and possibly decline further, resulting in a hike in activity in the construction and automobile industries. Both industries consume a substantial amount of paper and paperboard as well as related products that use wastepaper in their fiber furnishes.

In addition to this general improvement, new secondary fiber facilities started up in 1985 and expected to come online this year will also absorb wastepaper. These include Inland Container Corp.'s 175,000-tpy recycled linerboard mill in Ontario, Calif., which started up late last year. Fort Howard Paper Co. and Laurel Hill Paper Co. have brought online deinking facilities for new tissue mills in the past year, and Fort Howard plans future additions.

Virgin pulp markets, however, will have to improve before wastepaper can rebound. With pulp in significant oversupply throughout the world and prices depressed through much of 1985, it may take some time for those markets to recover. Until they do, secondary fiber will find stiff competition.

TABLE 1: **U.S. wastepaper prices, 1985 ($/short ton, f.o.b. seller's dock).**

Grade	First quarter	Second quarter	Third quarter	Fourth quarter	Full Year	% change from 1984
News (6)	$ 41.82	$ 45.00	$ 30.21	$ 29.79	$ 36.70	−26.9%
Corrugated containers (11)	37.34	48.75	31.25	31.66	37.25	−34.5
New double-lined kraft corrugated clippings (13)	77.97	78.75	55.36	52.29	66.09	−22.6
Hard white shavings (30)	224.37	204.06	141.56	168.33	184.58	−22.3
Computer printout (42)	204.06	202.50	141.67	142.29	172.63	−10.3
Manifold white ledger (41)	141.56	145.50	104.38	97.08	122.13	−12.1
Manifold color ledger (39)	112.81	117.50	81.88	75.62	96.95	−16.2

Numbers after each grade correspond to definitions in the current Paper Stock Institute of America Standards & Practices Circular (PS-83). These are paper and board mill purchase prices, f.o.b. seller's dock, exclusive of delivery charges and represent contract rather than spot or premium sales. Prices may not reflect actual transactions but represent estimates of current market conditions as obtained from representative sources.

Source: *Pulp & Paper Week.*

MARKET WILL DETERMINE PRICES. Low paperstock prices are expected to persist through at least the first half of the year, but they should improve steadily through the second half, with some upward movement possible earlier if the primary paper industry rebounds more rapidly.

If mill demand picks up quickly, prices could rise sharply in a short time because supplies were already low in some grades early in the first quarter. One observer expects that old corrugated containers could be selling at $50/ton, f.o.b. seller's dock even in some of the more depressed regions by June.

Domestic prices in most paperstock grades were still low in many regions in January as the primary mills resumed operations following their usual year-end maintenance and holiday shutdowns. During the last quarter of 1985, prices were off by more than 20% for most low grades and were off more than 10% in many of the high grades compared with a year earlier, when prices began to decline.

The exception was computer printout (CPO), which is traditionally a popular export item. CPO prices were actually up in some areas from the fourth quarter of 1984. Although exports remained relatively active in 1985, and CPO prices were fairly stable, other grades in demand overseas suffered price erosion—in some cases quite substantially.

According to NARI figures, old news prices to Taiwan and South Korea were down 21% in August 1985 from their levels a year earlier. To Mexico, news prices were down 32%. Pulp substitutes prices had also declined sharply, dropping 27% to Taiwan and 35% to South Korea. Nearly every other category was also down, but not by as much.

GOOD LONG-TERM OUTLOOK. Long-term projections call for U.S. paperstock markets to improve as overseas countries' demand for secondary fiber increases. This will put more pressure on U.S. supplies, causing the market to tighten and prices to rise. Old corrugated containers will be one of the major grades affected, according to J. Rodney Edwards, American Paper Institute vice president, paperboard.

In addition, the increase in waste-to-energy plants being constructed in the U.S. will raise demand for U.S. paperstock supplies. NARI as well as other groups and individuals have for the past several years been actively fighting flow control ordinances. Passed in some municipalities, these laws govern the control of the waste stream to ensure adequate supplies to these garbage-consuming facilities.

These factors at play in the marketplace should result in higher prices and tighter supplies of at least some grades of paperstock beginning later in the year. Other variables also could cause stronger markets, such as the use of various contaminants in secondary fiber supplies that are making some grades less feasible to recycle. Laser printing, for instance, has eliminated a substantial amount of computer printout for recycling, and it is forecast that this will result in mills switching to other grades such as hard white shavings, hard white envelope cuttings, and ledgers, in time. ■

TABLE 2: **U.S. wastepaper exports to major consuming countries, January to November 1985 vs 1984 (short tons).**

Country	Jan.–Nov. 1985	Jan.–Nov. 1984	% change
Canada	193,507	305,633	−36.7%
Mexico	416,567	451,213	−7.7
Italy	153,483	54,833	179.9
Spain	131,179	83,597	56.9
Japan	277,970	281,355	−1.2
South Korea	613,976	696,766	−11.9
Taiwan	685,079	676,274	1.3
Total	**3,007,202**	**2,977,647**	**1.0**

Source: U.S. Dept. of Commerce from National Assn. of Recycling Industries.

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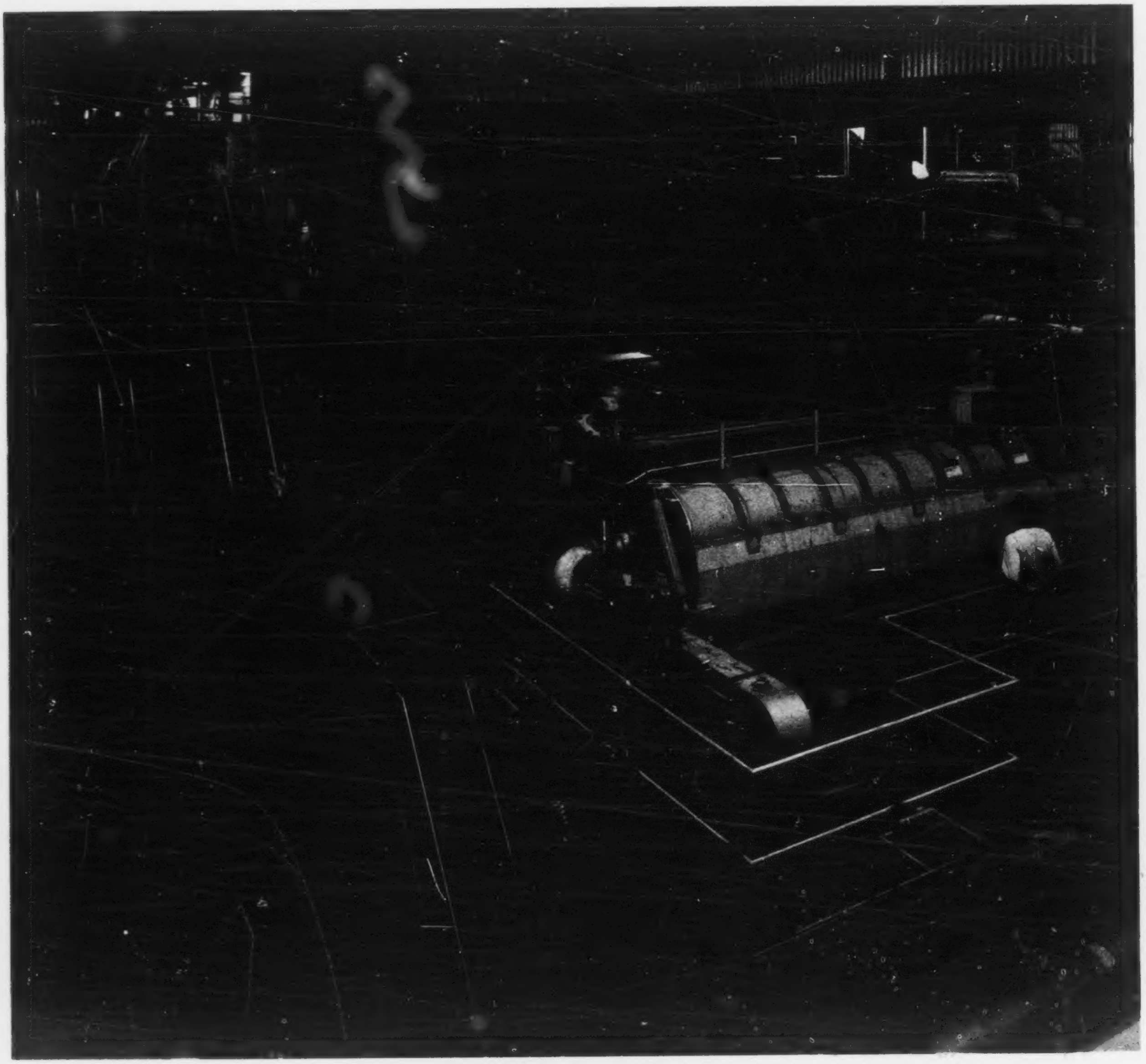
PULP & PAPER

April 1986



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AIR/WATER QUALITY: OFTEN OVERLOOKED WATER RECYCLING OPPORTUNITIES

PULP & PAPER

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER. 500 Howard St., San Francisco, Calif. 94105.

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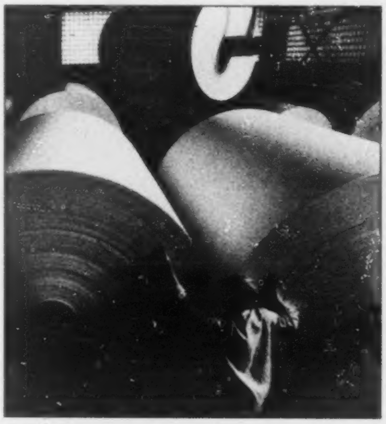

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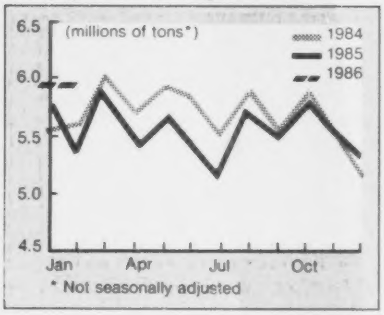
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard got off to a good start in January, rising to 5.9 million tons for a gain of 2.7% over January 1985, the American Paper Institute reported. The two-month moving average of seasonally adjusted data for January topped 70 million tpy, a new high, and preliminary data for February showed that trend continuing.

Among major grades, the strength in paper demand was concentrated in newsprint, uncoated free-sheet and tissue grades, API said, although newsprint production lagged January 1985 levels. Coated paper fell behind strong year-earlier levels, while packaging papers continued to decline in the face of competition from plastics. Containerboard production and corrugated box shipments set new records in January, and the other paperboard grades also rose sharply. Linerboard production for export jumped 45.7% compared with depressed year-ago levels.

Canadian newsprint shipments totaled 713,000 metric tons in January, down 3.5% from a year earlier. Operating rates fell from 96% in December to 94% in January. Canadian pulp shipments jumped 4.6% in January to 563,000 tons, while operating rates rose to 89% from 86% the previous month. ■

PAPER & PAPERBOARD PRODUCTION[1]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Newsprint	Jan.	463	−1.3	5,558	−1.1
Uncoated groundwood (s)	Jan.	128	4.9	1,535	1.6
Coated paper (s)	Jan.	521	−6.3	6,256	−7.5
Uncoated free sheet (s)	Jan.	885	11.5	10,616	11.4
Other printing/writing	Jan.	116	−1.7	1,395	−1.1
Total packaging and other paper (s)	Jan.	436	−4.4	5,234	−3.9
Tissue	Jan.	429	6.5	5,148	3.1
Total paper	**Jan.**	**2,979**	**2.1**	**35,744**	**1.6**
Unbleached kraft paperboard	Jan.	1,461	3.8	17,530	3.8
Semichemical medium	Jan.	443	6.2	5,318	6.3
Bleached paperboard	Jan.	351	3.8	4,210	7.5
Recycled paperboard	Jan.	684	0.3	8,212	4.1
Total paperboard	**Jan.**	**2,939**	**3.3**	**35,271**	**4.6**
Total U.S. paper and paperboard output	**Jan.**	**5,918**	**2.7**	**71,015**	**3.1**

PULP, WASTEPAPER & FIBER[2]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Total U.S. woodpulp production	Dec.	4,363	0.3	54,081	−2.6
Market pulp production	Dec.	537	−0.6	6,790	−1.5
Wastepaper consumption at paper/board mills	Dec.	1,207	−0.1	15,290	−2.8
Pulpwood consumption (cords)	Dec.	6,907	0.5	85,744	−2.2

CONVERTED PRODUCTS STATISTICS[3]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Corrugated box shipments (billion ft^2)	Jan.	24.075	4.1	24.075[6]	4.1
Containerboard inventories at U.S. box plants and mills	Jan. 1	2,477	0.3		

INTERNATIONAL TRADE[2]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
U.S. paper imports (including products)	Dec.	889	8.8	11,105	5.0
Imports of Canadian newsprint	Dec.	663	6.1	8,118[6]	5.7
U.S. paper exports (including products)	Dec.	332	10.3	4,008	−7.0
Exports of unbleached kraft linerboard	Jan.	173	57.3	2,077	45.7
Exports of woodpulp	Dec.	295	−5.1	3,791	5.5
Norscan pulp inventories[4]	Jan. 31	1,327	2.2		
Norscan pulp operating rates[4]	Jan.	85%	75%	92%	90%

CANADIAN STATISTICS[5] *(reported in metric tons)*

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Total newsprint shipments	Jan.	713	−3.5	713[6]	−2.8
Operating rates	Jan.	94%	96%	94%	96%
Inventories held by U.S. consumers	Jan. 31	1,399	−0.6		
Other paper/board shipments	Jan.	292	18.7	292	18.7
Woodpulp shipments (export only)	Jan.	563	4.6	563[6]	4.6
Operating rates	Jan.	89%	86%	89%	86%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

UNCOATED FREE-SHEET: Slow recovery continues

Grade structure: Uncoated free-sheet papers contain a maximum of 10% mechanical pulp with the balance being chemical woodpulp. Thus, uncoated groundwood papers are excluded. Also ruled out are cotton fiber papers, thin papers, and bristols. The major end uses are office papers (bond, forms bond, xerographic, tablet, and envelope) and printing papers (offset, cover, and text).

Production/capacity: For the third year in a row, U.S. industry set a new production record in 1985, outstripping the peak of the previous cycle (1980) by 1.7 million tons. More significantly, uncoated free-sheet was the only printing/writing grade to record an increase in 1985, and that was a healthy 5.6% jump. Since this outstripped the 5.0% capacity rise, operating rates increased.

The largest capacity expansion project in recent years has been the 350,000 tpy brought online in 1985 by International Paper Co. in Mobile, Ala., in a conversion from newsprint and kraft paper. The pace of capacity expansions for future years appears to be slowing down slightly from the hectic early 1980s, which saw capacity rise 22.2% from 1980 to 1985.

In 1986, the major expansions will be a new 230,000-tpy Georgia-Pacific Corp. machine at Port Hudson, La., and a 110,000-tpy conversion from market pulp at Boise Cascade Corp.'s Wallula, Wash., mill. Also in April or May, James River Corp. should complete its acquisition of Crown Zellerbach Corp.'s mills.

Outlook: Once again in 1985 the end uses represented by uncoated free-sheet did better than the economy as a whole. Excess capacity was a problem in 1984 and a somewhat smaller problem in 1985, but the excess is slowly being worked off. With economic activity growing respectably in 1986, it seems likely that a stable industry pricing policy will induce a stable growth pattern through the end of the year and allow the industry to repeat the impressive performance of 1985.

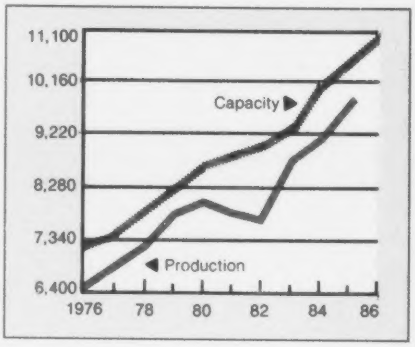
Some particular areas of promise can be seen. For example, forms bond shipments rose last year by about 6% and are expected to grow by another 4% to 6% in 1986. Another area that should do well this year is copy paper, which was up by 4% in 1985. Perhaps the critical question for the industry will be the performance of the commercial printing sector, which increased its use of uncoated free-sheet by about 3.5% last year. If advertising and promotional spending respond to the economic resurgence the way they usually do, uncoated free-sheet shipments to this area should rise even faster than in 1985.

Pricing: All pricing discipline was gone from the marketplace in the first quarter of 1985, when quotes for some commodity grades were as much as 25% below year-earlier levels—and heading down. But by April things had turned around and mills were able to get much of an announced $60/ton increase through. Some of it was lost again in the normally soft summer months. In October, prices headed up again, and by January quotes were a few points higher than in January 1985, with signs of further moderate increases on the way.

Price trends for two important grades are (year-end, $/short ton, list quotes except where transaction prices are considerably below list, when transaction averages are shown): book paper, No. 3 offset, 45-lb sheets—1976, $506; 1977, $545 to $555; 1978, $645; 1979, $711 to $717; 1980, $785 to $813; 1981, $878; 1982, $680; 1983, $840; 1984, $880; 1985, $800. Forms bond, 15-lb rolls: 1976, $520; 1977, $450 to $500; 1978, $538 to $550; 1979, $620; 1980, $643 to $697; 1981, $753; 1982, $640; 1983, $745; 1984, $680; 1985, $600.

Markets: Estimated shipments by end uses are: bond, mimeo, duplicating, xerographic—24%; forms bond—21%; offset printing—26%; envelope—11%; tablet—5%; others—13%. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

	1984	1985	1986e
Production[1]	9,207	9,722	10,218
Capacity[1]	10,058	10,562	11,030
Utilization rate	91.5%	92.0%	92.6%
Imports[2]	477	366	300
Exports[2]	65	66	70
Apparent U.S. consumption	9,619	10,022	10,448
lb/capita	81.69	84.29	87.03
GNP ratio	5.88	5.97	6.05

e = *P & P* estimate.

1. American Paper Institute data.
2. Commerce Dept. data.

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity	Market share (%)
1. International Paper	1,100	10.0
2. Champion Intl.	955	8.7
3. Boise Cascade	810	7.3
4. Great Northern	810	7.3
5. Union Camp	724	6.6
6. Hammermill Paper	692	6.3
7. Weyerhaeuser	580	5.3
8. Georgia-Pacific	575	5.2
9. Crown Zellerbach	482	4.4
10. James River	370	3.4

Market share of top five companies:
39.9%

Market share of top ten companies:
64.4%

Total U.S. capacity (1986):
11.030 million short tons

SALES & EARNINGS

U.S. sales/earnings reflect tough competition, depressed economy

1985 will be remembered by the U.S. paper industry for difficult export markets due to a strong U.S. dollar, depressed prices for pulp, linerboard, and some white paper grades, and tough competition everywhere. Of the 30 companies whose annual sales and earnings results are shown in the table below, half reported a rise in total sales, but only one third raised their earnings.

Total 1985 sales for the 30 companies is $59 billion, a rise of 1.6% over 1984. Income from continuing operations came to $2.4 billion, a 14.8% drop from 1984 (excluding where possible major nonrecurring items). Reflecting difficult economic conditions in paper and wood products, several companies reported large writeoffs connected with restructuring.

Georgia-Pacific Corp. came in first in 1985 sales, with a volume of $6.7 billion, but its earnings dropped by 18.2% to $207 million. G-P's chairman and CEO, T. Marshall Hahn Jr., reported that 1985 was one of the best years for G-P building products, but that "operating profits in pulp and paper declined to $9 million from the $202 million in 1984." Hahn blamed weak prices, major equipment conversion projects at several mills, and a lengthy strike at one major mill for the plunge in income from pulp and paper operations. However, he stated, "we anticipate improvement in both of our industry segments in 1986."

Ranking second in overall company sales, Champion International Corp. reported 1985 revenues of $5.8 billion, up 12.7% from 1984. Champion's net income of $163 million was 13.3% higher than it was in 1984. For its paper segment, Champion reported 1985 income from operations of $401 million, up 30% from the $309 million in 1984. This increase is primarily due to inclusion of two former St. Regis group operations: publication papers and newsprint. Throughout 1985, coated paper markets held up well, but results for printing/writing grades were below 1984, and uncoated papers remained weak, reported Champion.

Commenting on the results, Andrew C. Sigler, chairman and CEO, said he was pleased with Champion's divestiture and restructuring. "Our challenge now is to become more cost-effective so we can prevail in this tough new environment," he said.

International Paper Co. reported a year-end net profit of $131.3 million compared with a year-earlier loss, but said that pretax earnings dropped 65% before interest costs and nonrecurring items. For all of 1985, IP reported that net rose 11%, but pretax earnings for the year fell 40% before interest expense and nonrecurring items. John A. Georges, chairman and

TABLE 1: **U.S. paper/forest products industry results for 1985.**

	Full year ($000)			
Paper companies	**Sales**	**Change 1985/84**	**Earnings**[1]	**Change 1985/84**
Boise Cascade	$3,737,220	−2.1%	$104,290	50.0%
Bowater Inc.	904,004	1.8	67,520	8.0
Champion International	5,769,759	12.7	163,139[2]	13.3
Chesapeake Corp.[3]	454,063	29.6	15,694	−29.1
Consolidated	715,744	4.3	106,881	28.9
Crown Zellerbach	3,062,400	−1.0	79,400[2]	−23.1
Federal Paper	783,927	23.0	11,196	−69.8
Fort Howard Paper	1,363,292	1.8	157,010	18.0
Georgia-Pacific	6,716,000	0.5	207,000[2]	−18.2
P.H. Glatfelter	277,114	−10.9	38,612[2]	2.9
Great Northern Nekoosa	1,935,500	3.3	46,200	−61.5
Hammermill Paper	1,876,914	1.2	28,913	−48.3
International Paper	4,501,900	9.3	131,300[2]	9.3
Kimberly-Clark	4,072,900	12.6	217,500	22.8
Longview (10/31)[4]	459,058	−5.0	22,418[2]	12.2
Louisiana-Pacific	1,260,920	2.5	25.500[2]	8.7
Mead Corp.	2,740,400	0.7	93,500	−32.9
Mosinee Paper	187,724	−6.3	8,912	0.7
Pentair Inc.	534,198	−2.1	20,058	−5.6
Pope & Talbot	325,203	1.6	4,587	n.m.
Potlatch Corp.	950,323	−4.4	37,669	−24.1
Scott Paper	3,049,500	7.1	201,100	7.5
Jefferson Smurfit	630,425	−7.0	16,826	−31.3
Sonoco Products	869,598	17.4	49,409	16.2
Southwest Forest	700,092	−9.9	(12,323)	n.m.
Temple-Inland	1,243,100	−1.6	85,100	−17.1
Union Camp	1,865,871	−5.5	95,092	−47.6
Westvaco	1,721,783	−2.5	104,625	−19.5
Weyerhaeuser	5,205,579	−6.2	200,116[2]	−25.9
Willamette	1,152,067	−2.5	60,244	−9.0
Total	**$59,066,740**	**1.6%**	**$2,361,468**	**−14.8%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.

2. **Champion**: 1984 nets exclude after-tax writeoff of $150 million for restructure of building products plants and timber contract expected losses. **Crown Zellerbach**: 1985 net excludes $106.2 million for restructuring; 1984 year excludes $30.1 million restructure charge. **Georgia-Pacific**: 1985 income excludes $30-million after-tax disposal of discontinued operations; partially offset by after-tax gain of $10 million from settlement of land dispute; 1984 net excludes after-tax loss of $134 million from discontinued operations. **Glatfelter**: 1984 net excludes $24.6 million gain from sale of paper mill. **International Paper**: 1985 nets exclude pretax gain of $56.5 million, sale of stock and pretax charge of $155 million from adjustments to facilities and investments and pretax gain of $16.8 million from land sale; 1985 income includes credit for cumulative effect of accounting change on prior years. **Louisiana-Pacific**: 1985 year net excludes $29.4 million for cumulative effect on prior years of accounting change; 1984 year net excludes after tax $18.7 million from sale of National Gypsum holdings. **Weyerhaeuser**: 1985 year included 53 and 14 weeks, compared to 1984; 1984 net excludes $44 million after-tax charge from writedown of facilities, etc.

3 Data include results of mid-1985 acquisition of Wisconsin Tissue and Plainwell Paper.

4. Fiscal year ends Oct. 31.

( ) = loss. n.m. = not meaningful.

CEO, said that the strong dollar hurt shipments and prices in 1985 but added that the dollar's recent decline has begun to lift exports.

Weyerhaeuser Co. reported that total sales revenue of $5.2 billion was down 6.2% from the 1984 level, while net income of $200 million was down 25.9%. Company president George Weyerhaeuser said that he expected 1986 to be "considerably better" than 1985, partly because the drop in the dollar has already helped export markets for lumber, logs, and newsprint.

Tissue makers' good year. Kimberly-Clark Corp. and other sanitary papermakers had well-improved net income in 1985. On sales of $4.1 billion (12.6% above 1984), K-C had a net income of $217.5 million (22.8% above 1984). Scott Paper Co. had sales of $3 billion (up 7.1%) and net income of $201 million (up 7.5%)—both record highs for Scott. Philip E. Lippincott, chairman and CEO, attributed the rise "principally to strong performance in domestic and international sanitary paper product businesses."

Fort Howard Paper Co. reported sales of $1.4 billion (up 1.8%) and earnings of $157 million (up 18.0%). Fort Howard's chairman and CEO, Paul J. Schierl, said "tissue operations were strong throughout the year," but a high level of competition in disposable food and beverage service products caused a modest decline in sales for the fourth quarter.

Timber restructuring. Crown Zellerbach Corp. reported a net loss for 1985 of $26.8 million, including a net loss provision of $106.2 million for restructuring. The company said that income before unusual items was $79.4 million, compared with $103.2 million a year earlier (before a special item). The paper group (being acquired by James River Corp.) had operating earnings $91.7 million, down 21% from a year ago. Timber and wood products income, however, rose to $16 million vs $1.8 million in 1984, reflecting a streamlining of operations. (James River is on a fiscal year schedule; its earnings were unavailable at this writing.)

Paperboard and pulp difficult. "It was a buyers' market for paperboard and pulp in 1985," commented Mead Corp.'s chairman and CEO, Burnell R. Roberts. Mead's sales of $2.7 billion in 1985 were close to 1984 (up 0.7%), but net income of $93.5 million was down by 33%. Roberts expects improved demand in 1986. ■

Canadian mills did better in 1985 but could improve

The year 1985 will not go down in Canadian history as a great year for economic growth, but most Canadian pulp and paper companies reported improved sales and earnings compared with 1984. For example, British Columbia Forest Products Ltd. turned in its best performance since 1980, said K.P. Benson, BCFP's president and CEO. Most industry executives would concur with his comment, "while 1985 results were a big improvement over the four previous years, markets are still poor."

Of the dozen companies whose 1985 results are listed in the accompanying table, ten reported a growth in sales figures while eight showed improved earnings over 1984.

Efficiency improvements credited. Crown Forest Industries Ltd., returning to profitability after a loss in 1984, is "a leaner, more market-conscious producer, better able to compete in a difficult economic climate," said Ian Donald, Crown Forest's president and CEO. The company enjoyed its first profitable year since 1981.

Abitibi-Price Inc. rang up a 26% improvement in its 1985 earnings, and president and CEO Bernd Koken said that "among positive factors contributing to increased earnings were effective control over costs" as well as growing benefits from recent capital expenditures and inclusion of earnings from two acquisitions made during the year. Recent weakening of the Canadian dollar vs U.S. and overseas currencies is "having a positive effect on the company's international competitive position," said Koken. He expects further earnings improvement in 1986 due to expected increased demand for newsprint and groundwood papers and "a richer mix of higher-value papers."

MacMillan Bloedel Ltd. increased its 1985 net income by 122% over 1984, but MB president and CEO Ray Smith said "results show the company still has a long way to go to provide adequate return on equity investment. With no sharp growth in demand for our products expected, the challenge in 1986 is for labor and management to continue efforts to bring us in line with competitors."

Charles Carter, chairman and CEO of Great Lakes Forest Products Ltd., found that "the higher U.S. dollar made a big contribution to revenues, offsetting lower shipment volumes of kraft pulp and newsprint." ■

TABLE 2: **Canadian paper/forest products industry results for 1985.**

	Full year (C$000)			
Paper companies	**Sales**	**Change 1985/84**	**Earnings[1]**	**Change 1985/84**
Abitibi-Price	C$2,549,800	19.3%	C$100,200[2]	42.9%
British Columbia Forest Products	1,140,000	12.9	30,100	227.2
Cascades Inc.	266,272	48.2	19,443	53.8
Consolidated-Bathurst	1,727,000	6.4	79,800[2]	8.1
Crestbrook Forest Industries	142,012	2.9	(3,028)[2]	n.m.
Crown Forest Industries	853,000	15.2	16,600	n.m.
Domtar	2,129,500	4.2	96,100[2]	11.6
Donohue	425,000	−3.1	20,700[2]	−31.7
Great Lakes Forest Products	592,110	−1.6	3,550[2]	−80.2
MacMillan Bloedel	2,335,400	9.8	42,900	122.3
Rolland	300,700	5.7	5,200[2]	−27.6
Weldwood	628,831	9.9	7,384[2]	n.m.
Total	**C$13,089,625**	**10.0%**	**C$418,949**	**31.1%**

1. Income after taxes, from continuing operations, exluding most significant nonrecurring items in both years.
2. **Abitibi:** 1984 net excludes $2.2 million charge for sales of facilities; **Consolidated-Bathurst:** net excludes special charges in both years, for writeoff of some investments and plant closing; **Crestbrook:** 1985 income excludes special charge of $4.9 million for startup of pulp mill optimization program; **Crown Forest:** net for 1984 excludes extraordinary gain of $2.9 million timber trade. **Domtar:** 1984 omits $4.4 million special gain; 1985 excludes $14.3 million special gain; **Donohue:** 1984 figures have been restated to reflect effective tax rate for 1984; **Great Lakes:** 1985 net excludes special charge of $3.3 million for settlement of claims for mercury pollution in Wabigoon-English River system; **Rolland:** 1985 net excludes $935,000 gain from sale of property; **Weldwood:** 1984 net excludes $1.4 million special charge; 1984 resulted in losses.

( ) = Loss. n.m. = Not meaningful. n.a. = Not available.

LIQUID PACKAGING DECLINES IN MILK MARKETS BUT GROWS IN NEW END USES

New end uses are expected to ease the current overcapacity in carton board; aseptic packaging should boom as food processors experiment

By DEBRA A. ADAMS, Senior News Editor

Producers of liquid carton board have lost market share in milk packaging consistently over the past 15 years as plastics have carved out their own substantial niche. With better technology, improved products, and new expanding markets, though, paperboard is gaining once again.

Since 1970, milk carton stock tonnage has fallen fairly steadily from 941,000 short tons to 591,000 tons in 1982. In 1983, however, milk carton stock production was up by 2.7% to 607,000 tons and rose 6.3% in 1984 to 645,000 tons. In 1985, it fell more than 2% for the first three quarters, but some observers thought production might flatten out and end the year at about the same level as in 1984.

Some market observers attribute this leveling off in market share erosion to a campaign launched by the Paperboard Packaging Council, an industry trade association. The PPC program, sponsored by its member companies making liquid packaging board, was started in 1983. That same year, milk carton shipments began to turn around.

The PPC suspects the absence of its campaign in 1985 adversely affected shipments. The promotion was halted by a court injunction pending the outcome of a lawsuit charging the ads with false claims. Subsequently, the PPC was ordered to modify the content of its campaign (*P&P*, Nov. 1985, p. 31). The campaign was restarted early this year.

CAMPAIGN TO PROMOTE CARTONS. The PPC's promotion consists of television announcements to consumers in designated locations throughout the U.S., citing university reports indicating light can damage the nutritional content of milk and adversely affect its flavor. The campaign also introduced the paperboard gallon "two-pak" as an alternative to the plastic gallon jug in an attempt to regain some of that market.

Individual companies have also produced promotions for milk cartons. Aimed at dairies and retailers, as well as consumers, these advertisements note paperboard's superior graphic qualities that allow better product identification and point-of-sale advertising, in addition to underscoring the PPC's claims regarding vitamins and flavor, as well as other advantages.

Most of paperboard's loss of the milk packaging market share has been in the gallon and half-gallon sizes in the West and Midwest regions, according to S. Edward Iciek, PPC president. Since 1980 the erosion in the gallon size has eased, but now there is concern about further loss in the half-gallon market.

The paperboard container lost market share in the gallon size chiefly because it was an unwieldly package and cost more than plastic, observers said. Cartons in the half-gallon and smaller sizes are substantially more economically competitive than the gallon size. The opposite is true for plastic. It costs about the same to make a plastic gallon as a half-gallon, one marketing executive said.

Some feel plastics could capture as much as 50% of the market currently held by paperboard in the half-gallon segment of the market. Others feel the erosion will be less. Most, though, are convinced some shifting will occur.

The U.S. Dept. of Agriculture figures indicate that of the gallon containers of fluid milk sold in 1983 (the last year for which statistics are available), 96.7% were plastic and 3.3% were paperboard. In the half-gallon size, 86.9% were paperboard and 11.7% were plastic. In the

TABLE 1: **Fluid milk sales by package size and type.***

Container size	Total sales (million lb)	Type of container		
		Glass	Paper	Plastic
		(percent of total sales)		
Gallon	2,028.5	—	3.3%	96.7%
Three-quart	0.3	0	83.2	16.8
Half-gallon	794.6	1.4	86.9	11.7
Quart	174.4	1.7	97.1	1.2
Pint	53.4	—	99.5	0.4
Half-pint	333.4	0.1	99.5	0.4

*Sales for 1983 by handlers regulated in Federal Milk Order markets.
(—) Figures less than one tenth of one percent.
Source: U.S. Dept. of Agriculture.

TABLE 2: **Percent of fluid milk sales by package type.***

Year	Glass	Paper	Plastic	Other
1963	32%	63%	n.a.	5%
1966	25	67	6%	2
1971	7	78	15	—
1977	1	58	41	—
1983	—	38	62	—

*Represents total fluid milk, including whole, lowfat, and skim.
(—) Figures less than one half of one percent.
n.a. = Not available.
Source: U.S. Dept. of Agriculture.

smaller sizes, paperboard still had more than a 97% share of the market (Table 1).

According to USDA, total fluid milk packaging has shifted from paperboard having a 78% share in 1971 to 38% in 1983. During that time, plastic went from 15% to 62% (Table 2).

The PPC is hopeful that its campaign has halted the penetration of plastics into the gallon markets and that further erosion in the half-gallon and smaller sizes will not be significant.

In addition to the PPC promotional efforts, the market itself seems to be shifting back to paperboard due to outside influences. A study completed in 1985 by one research firm forecast a decline in demand for the gallon size by the year 2000 due to demographic factors.

The report indicates that the maximum number of people who buy gallon containers has already been reached and will decline with the projected decrease in the size of the average family. With smaller households, more smaller packages will be purchased. And most of these containers are likely to be made of paperboard due to its cost advantages over plastic in the smaller sizes, the study indicates.

Also, the market practice of pricing milk in gallons more cheaply on a volume basis compared with half-gallons is expected to change to make the price of each size more equitable, according to one close observer. He indicated that part of the problem with carton stock is retail prices that make larger containers cheaper by more than a few pennies.

NONMILK USES BOOMING. While demand for milk carton appears promising for the future, other end uses are also expected to ease carton board overcapacity. Demand for paperboard in the juice and nonmilk markets has risen from virtually nothing to an estimated 20%, according to industry estimates. Iciek noted that juice and juice drinks comprise about 20% of the total milk carton market now compared with 5% about 15 years ago.

Some suspect the trend to fresher foods has been a substantial factor in the shift of juices and other nondairy drinks from cans, bottles and other containers to paperboard. Cartons connote freshness, according to Earle Bensing, vice president and general manager of Champion International Corp.'s DairyPak Div. Last year, Champion introduced a new liquid packaging board called the "TasteSaver," which keeps juices fresher longer without a foil layer by using a polypropylene coating in addition to a polyethylene.

"The consumer likes refrigerated, fresh products," said Bensing. "If you look into the dairy case of a supermarket and see the amount of refrigerated products there, you can see one of the reasons that an aseptic milk has not been a success in this country."

Once concerned about plastics stealing markets from paperboard, many industry executives now expect plastics to help cartons in the long term. They think future combinations of resins with paperboard will produce better packages and increase paperboard volume over time. "With all these polymers, people are going to find many more uses for paperboard," said Clark Mounsey, vice president of Weyerhaeuser Co.'s bleached paperboard division.

ASEPTIC OPENS UP NEW USES. One of the most innovate packaging ideas to enter the market in recent years was the result of creatively combining synthetic fibers and paperboard. Known as the aseptic package, this container keeps foods fresh for months without refrigeration. It was only introduced in the U.S. in 1982, when it was approved by the Food & Drug Administration, but has existed in Europe and other countries for more than two decades.

While aseptic packages are an alternative container for such beverages as milk, they have not competed directly with milk carton board. In fact, aseptic packages should help the solid bleached sulfate (SBS) paperboard market in the future by providing another end use, industry observers noted.

Unfortunately, the growth in the U.S. aseptic market has not been as rapid as the industry had hoped. The North American market is estimated to be just 10,000 tpy. And of that amount, most of the aseptic board is imported from Europe and converted in the U.S.

Juices and juice-drinks are the most popular end use for aseptic packages currently, and most of these packages are produced by Tetra Pak, observers indicated. Combibloc Inc. uses some U.S. produced board, but Tetra Pak imports most of its requirements. One observer indicated that most U.S. board is inferior because no domestic milk carton machine has coaters sophisticated enough to meet the high quality standards of this type of packaging.

Most of the world's aseptic packaging comes from its inventor, Tetra Pak. A Scandinavian company with $2 billion in sales, Tetra Pak is estimated to have 90% of the world's market share of aseptic packaging. Combibloc, of Columbus, Ohio, is said to be the second largest producer, followed by International Paper Co., the latest comer to the marketplace.

IP GEARING UP TO BE NUMBER TWO. IP claims to have the most sophisticated extruder of its kind in the world. It can produce a nine-layer product with seven resin layers, and one layer each of aluminum foil and paperboard at its Raleigh, N.C., operation. The board is supplied from its mills in Moss Point, Miss., Texarkana, Texas, and Pine Bluff, Ark.

IP entered the aseptic business in 1981 when it bought world rights from an Italian company. It has since expanded sales to eight countries and expects to increase that number to 16 over the next few years, according to one IP executive.

IP is the only primary producer in the world also involved in leasing and selling aseptic machinery as well as providing the aseptic board, the company indicated. The world's largest supplier of milk carton board, IP plans to become the world's second largest producer of aseptic packaging by 1988, said David Fergus, marketing manager of IP's extended shelf life packaging division.

"There is a tremendous extension and expansion of the product expected in the next couple of years," he said. The juice and drinks market is expected to grow by 10% annually, while end-use markets such as mineral water, wine, edible oils, tomato purees and sauces, and other foods should grow at a faster rate, he said.

Most market observers agree with Fergus that aseptic will continue to grow at least 10% a year in some end uses in the next few years and double to a 20,000-tpy market in North America in five years. They say probably the biggest factor in its future growth is a willingness by food processors to experiment. Earlier this year, Campbell Soup Co. began test marketing 8¼-oz packages of soup in aseptic cartons. This board, which combines layers of paperboard, foil and polyethylene, is converted by Combibloc, according to Campbell.

Some observers feel that now Westvaco Corp. will be the next to try to cash in on the growing aseptic market. The company's new 175,000-tpy solid bleached sulfate machine at the Covington, Va., mill, which is slated to start up this spring, will be partially dedicated to supplying aseptic board, observers indicated. Westvaco refused to comment, however.

Despite the optimistic projections for its growth, observers are not hopeful that it will become a popular package for milk in the U.S. due to the availability of refrigeration. Its current market is based on convenience and is mostly used by children as a lunch box item.

"The synergy between the 'natural' juices and the convenient aseptic packaging has attracted the attention of a wide variety of consumers and appears to be expanding the category's overall niche," reported *Advertising Age* in its Sept. 19, 1985 issue. The magazine estimated that aseptics accounted for only 4% of the juice-drink sales in 1984. And the market is growing. *Beverage Industry*, a trade publication, reported sales of pure juices were up 2% in 1984, while ready-to-serve—the segment that includes aseptics—spurted ahead 15%.

TABLE 3: **Milk carton production, 1960-87.**

Year	Production (short tons)	% change*
1960	571,000	n.a.
1965	752,100	+31.7
1970	940,700	+25.1
1975	865,800	−8.0
1980	677,600	−21.7
1985 (P)	607,800	−10.3
1987 (E)	645,000	+6.1
1980	677,600	—
1981	631,800	−6.7
1982	590,500	−6.5
1983	606,900	+2.8
1984	645,100	+6.3
1985	607,800	−5.8

*Figure represents percentage change from prior year in order indicated in table.
n.a. = Not available.
P = Preliminary.
E = Estimate from Morgan Stanley.
Source: American Paper Institute.

Frost & Sullivan, a New York, N.Y.-based research company, expects sales for the entire juice and drink category to increase at a 3% annual rate but sees 100% juice blends leading the way with a 20% growth rate.

OVERSEAS MARKETS TO GROW. While the outlook for liquid carton demand in the U.S. looks good, the prospects in overseas markets is even better. The U.S. produces about 1 million metric tpy of the 1.7 to 1.8 million tpy of demand for liquid packaging board worldwide, according to one estimate.

In Europe, for instance, plastics are not a high-growth market. For one thing, Europeans prefer smaller cartons, with the liter being the largest size. In addition, milk consumption is higher than in the U.S.—especially in the Scandinavian countries—and continues to grow. Currently, Europe consumes about 750,000 metric tpy of liquid packaging board. Also, the switch to paperboard from glass—which began in the U.S. decades ago—continues in Europe.

Various changes in customer preferences around the world is also having a beneficial effect on the liquid packaging board market due to increasing preference for higher-quality graphics, and more durable containers, as well as other characteristics. "We believe that there will be better printing in the future, with offset and gravure. Flexography is acceptable for the most part, but as we get into more drinks and juices those companies are going to want a package that looks like a label on a can or bottle," said Champion's Bensing.

In addition to new extruded coatings to improve containers, Champion is also investing about $17 million in its No. 19 milk carton stock machine at the Canton, N.C., mill. This will upgrade the strength and print surface of the board, Bensing noted.

EMERGING TRENDS WILL HELP. Better graphics is one of the key reasons why many observers expect that the infiltration of plastics into the milk containers market will flatten out, especially in sizes smaller than a gallon.

Alvin Schechter, president of Schechter Group, a New York-based packaging design company, underscored the importance of graphics in aseptic and other types of packaging. "If past history holds, marketers will put in metallic paper, better-quality paper, and other distinguishing characteristics to make a quality presentation," he said.

Strength is another consideration as the industry moves more into juices and other nonmilk areas. "One of the major differences or challenges in packaging juice or drink items over milk is the longer shelf life. The longer a liquid is held the more demand it puts on a package," said Bensing. Usually, milk has a shelf life of no more than 12 to 14 days, while juices and other beverages typically can last 30 days or longer.

To keep pace with increasing demand for higher-quality board suited for a variety of end uses, milk carton producers in recent years have been investing in various technological improvements.

IP noted that its decision to launch into the aseptic market was based on its belief that cartons would be evolving in the coming years. "With the standard liquid packaging business losing to plastics, it became obvious to IP that if we wanted to preserve our share as the world's largest worldwide supplier of board, we had to get into aseptic packaging," said Stan Bryant, general manager of IP's extended shelf life packaging division.

While many of the milk cartons produced worldwide are licensed by Ex-Cell-O Corp.—inventors of the gable-top container—producers continue to make variations in the basic package as well.

Weyerhaeuser, for instance, is currently test marketing a gable-top package for oil. The container, developed with Ex-Cell-O Corp. and produced at Weyerhaeuser's plant, is about the same dimensions width-wise as a half-gallon milk carton container but half as tall.

Other producers are testing containers for other products. One, a wine package, also resembles a gable-top milk carton. Water packaging using carton board is also being developed.

With these new packages and emerging markets, bleached board producers in general and milk carton manufacturers in particular hope to win their fight for market share. They feel they may have halted the competition's advance, if not actually instigated its retreat. ■

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MILLS OFTEN OVERLOOK SIGNIFICANT WATER RECYCLING OPPORTUNITIES

The U.S. pulp and paper industry is the nation's largest consumer of process water, yet chances for water use reduction are often missed

By J. CRAIG WYVILL, P.E., JOHN C. ADAMS, P.E., and G. EDWARD VALENTINE

Water is a critical element in the production of pulp and paper products. Almost every manufacturing step requires the use of significant quantities of water. This high process water demand combined with the tremendous production output of the industry makes the paper and allied products industry one of the largest water users of all U.S. manufacturing industries. Historically, the pulp and paper industry has made a conscientious effort to reduce its dependence on freshwater through conservation and recycling/reuse measures.

INDUSTRY WATER CONSUMPTION. The U.S. leads the world in the production of paper and paperboard products. More than 700 facilities in this country are currently involved in the manufacture of pulp, paper, and paperboard products. In 1975, these facilities withdrew 8.9 billion gal/day of water, making them the third-largest industrial water-using group in the nation, behind the chemical products group and the primary metals group. Unlike most other water-using industries that apply the majority of their water to cooling cycles, the pulp and paper industry uses more than 60% of its water withdrawal for manufacturing. This makes it the largest industrial process-water user in the nation.

Recent production statistics for the industry show that 72% of all production and 85% of all water withdrawal are achieved by 189 mills in ten general production categories. Table 1 presents a geographic breakdown of these mills, listing the number of mills in each of 15 regions together with their total water withdrawals. This breakdown shows that two-thirds of these withdrawals occur in three regions: the South Atlantic, lower Mississippi and the Pacific Northwest.

EXTENT OF WATER RECYCLING. During the past 30 years, mills across the U.S. have made giant strides in reducing their dependence on freshwater. Industry-wide data show a reduction from an average of 39,000 gal/ton in 1955 to about 27,000 gal/ton in 1972. In 1975, the paper and allied products sector had the second-highest water recirculation ratio in the U.S., behind only the petroleum and coal products sector.

The recent force of environmental regulation coupled with the more long-standing economic incentives to conserve chemicals, energy, and fiber help explain the significant capital expenditures for recycling measures. The results of these endeavors are clearly evident today. Table 2 shows both the 1981 average freshwater usage rates for typical mills in various production categories together with the best achieved by a mill in each category. On average, these values are well below even the 1972 levels mentioned earlier.

OPPORTUNITIES FOR EXPANDED RECYCLING. As stated earlier, it is difficult to make broad generalizations regarding common recycling combinations employed in the pulp and paper industry. Nearly every mill was found to have a unique approach to applying water recycling measures. The resultant variation in water demand for different types of mills is evident in the values

TABLE 1: **Regional distribution of pulp and paper mills in major producing categories and their estimated water requirements.**

Region	Number of mills	Water usage (000 gal/day)	Percent of total water
New England	21	250	6.7
Mid Atlantic	16	218	5.9
South Atlantic	47	1,391	36.7
Great Lakes	21	180	4.8
Ohio	10	91	2.4
Tennessee	3	74	2.0
Upper Mississippi	10	76	2.0
Lower Mississippi	16	420	11.3
Souris-Red Rainy	1	25	0.7
Arkansas White-Red	4	37	1.0
Texas-Gulf	6	166	4.5
Lower Colorado	1	12	0.3
Pacific Northwest	26	711	19.1
California	5	50	1.3
Alaska	2	47	1.3
Total	**189**	**3,748**	**100.0%**

Mr. Wyvill and Mr. Adams are research engineers, and Mr. Valentine is a research scientist. All are associated with Georgia Institute of Technology's Engineering Experimental Station in Atlanta, Ga.

displayed in Table 2. The gap between average and best achieved in each category is often very significant. Recycling strategies were observed to be dictated by various factors such as cost savings, resource conservation and recovery, and environmental restrictions.

The costs associated with excessive freshwater use are many and varied. They include freshwater supply cost, waste treatment of the additional effluent volume, added thermal requirements to offset the cooling effect of freshwater usage, and additional chemical costs to maintain proper whitewater conditions.

Table 3 shows observed monthly costs associated with pumping and treating groundwater. The average monthly delivery costs for this operation were approximately $0.14/1,000 gal, and waste treatment costs averaged $0.24/1,000 gal. These figures do not include the capital costs associated with drilling a well or constructing the treatment plant. Because this particular production facility had been in existence for more than 20 years, these costs were no longer taken into account.

An observation made while visiting mills throughout the country was that there are some recycling schemes that have broad technical potential and general economic attractiveness and yet for one reason or another are not widely employed in the industry. Listed below are four such schemes which could have a substantial impact on future water demand if broadly employed.

MACHINE SHOWERS. A much discussed method of reducing machine freshwater usage is to utilize whitewater on wire showers, headbox showers, and various other low-pressure, high-volume applications. Yet few mills use these concepts to any notable extent. The reason most often given is the expense and attention required to keep whitewater showers operational.

Mills with a strong motivation for recycling are finding ways to utilize whitewater extensively on the paper machine. Most employ showers with self-purging, large-orifice-size (0.05- to 0.06-in.) nozzles incorporated with 60-mesh strainers. This typically results in satisfactory performance and operation. Studies on shower pluggage have indicated that pluggage is a result of whitewater particles longer than 0.1 in. In the absence of long fibers, levels above 3,000 ppm of contamination have worked satisfactorily in conjunction with conventional self-purging nozzles. Whitewater showers can reduce machine freshwater requirements by almost 500 gal/ton for a model 600-tpd machine.

From the example of treatment and pumping costs outlined in Table 3, the costs associated with drawing and treating groundwater for this operation could amount to nearly $0.46/ton of product based on a flow of 500 gpm. This amounts to over $97,000/year in savings for a 600-tpd machine if whitewater recycling is instituted.

The thermal and chemical costs associated with excess freshwater usage are equally significant. Consider the same 600-tpd machine operating at a temperature of 140°F and a pH of 5.0. If freshwater were utilized on the low-pressure applications, such as wire knockoff showers, grooved roll showers, etc., a net cooling would result. At a rate of 500 gal/ton, maintaining machine operating temperature would require 6.24 million Btu/hour, or $210,000/year (assuming a delivered heating cost of $4/million Btu and a freshwater supply of 80°F). Correspondingly, it would require an additional 0.56 lb/ton of acid to reduce the freshwater pH to 5.0. These additional costs could approach $3,000/year for sulfuric acid at $50/ton.

The total costs associated with the use of freshwater instead of whitewater showers could exceed $300,000/year for a 600-tpd machine. While it could be argued that the thermal heating cost is unrealistic since most mills use waste heat from digester blows or waste low-pressure steam for this application, this is not necessarily true. Only if this waste heat could not otherwise be utilized would this be accurate. As long as purchased fuels are used to generate heat, all waste streams should be utilized at the point in the process where they can be optimally beneficial. The waste heat from digester flows

TABLE 2: **Comparison of average water usage vs the lowest for the ten major production categories.**

	1981 average water usage (gal/ton)	1981 lowest water usage (gal/ton)
Dissolving kraft	44,200	34,500
Market bleached kraft	35,000	17,000
BCT bleached kraft	37,600	24,800
Alkaline fine paper	44,900	19,500
Unbleached kraft	15,800	5,600
Unbleached kraft & supercalendered	11,400	7,300
Dissolving sulfite	70,600	66,700
Papergrade sulfite	51,400	9,300
Miscellaneous integrated	27,500	5,500
Nonintegrated fine paper	18,400	5,600

TABLE 3: **Monthly self-supplied delivery and wastewater treatment costs for a southern plant.**

Monthly expenses	**Delivery ($)**	**Wastewater ($)**
Power	$4,887.50	$9,775.00
Labor	4,125.05	1,625.52
Chemical treatment	1,622.23	1,152.12
Maintenance	317.67	55.67
Total	**$10,951.45**	**$12,608.31**
Monthly output	**Delivery (gal)**	**Wastewater (gal)**
Plant	76,382,000	53,028,417
Filter backwash	1,282,750	
Total	**77,664,750**	**53,028,417**
Unit cost (per 1,000 gal)	$0.14	$0.24

and low-pressure steam might be better used for other applications such as bleaching, brownstock washing, or boiler feedwater heating if waste heat can be recovered in the paper machine by recycling whitewater.

Costs of instituting a program to utilize whitewater showers range from minimal to as much as $150,000/machine. Very low costs are usually associated with those mills that have bypassed old recycling systems for one reason or another. These mills need only to invest in modern filtration and shower equipment to bring their system up to date, thereby eliminating problems associated with older designs. Table 4 shows that a simple payback for the worst case would still be less than one year, including maintenance costs.

FELT SHOWERS. As with machine showers, felt showers also can use whitewater recycling. Another technique for reducing freshwater demand is high-pressure shower heads. It has been reported that a representative machine's felt shower water requirements can be reduced by over 93% by using high-pressure, intermittent showers. Table 5 shows a comparison of a conventional low-pressure system vs a proposed high-pressure system. For most mills this high-pressure approach, even though using freshwater, is more attractive than using high-volume, conventional showers with whitewater recycling. Both concepts offer advantages. Some combination of the two technologies may actually prove most desirable by reducing the capital costs related to whitewater clarification and the operating costs associated with reduced felt life from the high-pressure (up to 700-psi) showers.

The cost savings associated with modifying felt showers can be estimated by using an approach similar to that for whitewater machine showers. Assuming that half of the total freshwater demand shown in Table 5 is actually required, with the remainder being whitewater, then net freshwater use could be reduced by 500 gal/ton on a 600-tpd machine. This yields a potential savings offered above by using whitewater showers in the forming section.

TABLE 4: **Simple payback calculation for whitewater showers.**

Installation cost (I)	= $150,000
Operation and maintenance cost (O)	= $ 55,000/year
Annual savings (S)	= $250,000/year

$$\text{Simple payback} = \frac{I + O}{S} = 0.82 \text{ years}$$

TABLE 5: **Comparison of a conventional paper machine shower system with a high-pressure, low-volume system.**

	Conventional low-pressure system (gal/day)	High-pressure low-volume system* (gal/day)
Purge-type roll shower	389,000	29,000
Felt wetting	150,000	Eliminated
Felt cleaning	58,000	4,000
Felt lubrication shower	43,000	9,000
Total water	**640,000**	**42,000**

* Intermittent shower at 90 min/day.

However, felt life and efficiency could be adversely affected. Further, the corresponding whitewater chemical constituents and felt material may not be optimally suited. These problems can be addressed by changing to higher-synthetic-content felts and using lower shower pressures.

Costs for felt shower modifications have gone as high as $300,000, excluding operating expenses, and have had simple paybacks exceeding two years. However, the approach may have more merit as a capital avoidance measure for mills considering the costly expansion of waste treatment facilities.

Avoidance of waste treatment costs is not always considered by mills since most operate their own facilities and treat them as fixed capital assets. Many mills consider operating costs to be relatively constant whether the facility operates at full volumetric load or some fraction thereof. Chemical and aerating expenses are less sensitive to volumetric load than they are to BOD_5 load. Increased recycling can reduce waste volume, allowing either greater retention or more flow in existing waste treatment plants.

Consider a bleached kraft mill waste treatment plant handling 80 lb of BOD_5/ton of production and 40 million gal/day of effluent. Given a 10-day retention period of aerated and nonaerated lagoons, 64,000 lb of BOD_5 can be consumed daily. If this same mill instituted improved recycling schemes that reduced effluent volumes by 5 million gal/day, then even with the same level of BOD_5 emissions, the existing waste treatment plant would be capable of handling the additional 5,000 lb of BOD_5/day. This extra capacity could be utilized either to handle a production increase of 78 tpd of paper or to provide a safety cushion in meeting existing permitted levels.

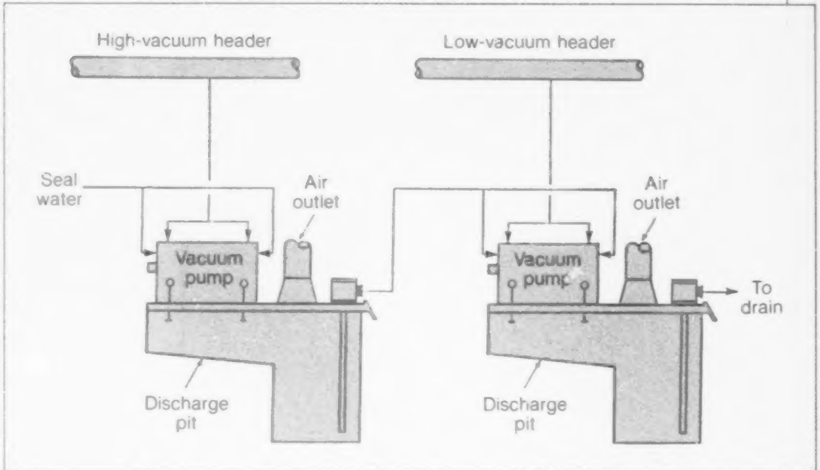
VACUUM PUMPS. The freshwater requirements for vacuum systems can account for as much as 1,800 gal/ton of machine production. Most mills meet this requirement with freshwater because of the potential for corrosion problems often associated with using whitewater in carbon steel pumps.

TABLE 6: **Cost reductions associated with converting to vacuum pump cascade sealwater system.**

Freshwater use cost (C)	= $0.38/thousand gal
Vacuum pump freshwater use reduction (U)	= 900 gal/ton of product
Annual machine production (P)	= 213,000 tpy
Cost reduction = C x U x P	= $72,800/year

Some mills have built closed whitewater systems for the vacuum pump seal system designed to reduce freshwater consumption. Such schemes reduce water requirements by 90%. Cascading sealwater from high-vacuum pumps to low-vacuum pumps before sewering is another approach (Figure 1). This technique offers up to a 50% reduction in water use at low capital cost. Both approaches require adequate air/liquid separators in vacuum lines to control machine whitewater chemical buildup in sealwater systems. The advantages of a separate water recycling system in vacuum pumps include fewer scale and corrosion problems in addition to greater vacuum reliability related to better sealwater temperature control.

FIGURE 1: **Cascade system for vacuum pump sealwater.**



A third alternative for reducing freshwater use in pumps is the elimination of sealwater requirements by converting to dry, lobe-type vacuum pumps. This high-capital-cost alternative was found unattractive unless there were specific replacement opportunities, such as the retirement of an existing pump.

From observations on all three systems, it can be said that unless strong economic incentives exist to convert to a closed sealwater system, the most viable approach is to convert to a cascade sealwater system. Savings justifications are typically reported only on reducing the cost of freshwater use, unless the mill currently recycles vacuum system effluents to the machine whitewater system. The cost for converting to a vacuum pump cascade system was as high as $65,000, including an additional seal pit, adequate filtration, and temperature control. The resulting 50% reduction in freshwater use does yield a net annual savings of nearly $73,000 (Table 6). Using the aforementioned $0.38/1,000 gal usage cost for a model 600-tpd machine, simple payback can be less than one year barring additional maintenance costs.

PROCESS WATER SUPPLEMENT. One southern mill has instituted a unique water recycling scheme resulting in a reduction of freshwater consumption by nearly 7 million gal/day. The principal motivation for the reduction was the high cost of waste treatment performed by the nearby municipal facility. The basic recycling technique involved rerouting approximately 50% of the paper machine effluent (after screening) back to the freshwater clarifier for dilution and fiber flocculation. By this method, roughly 50% of the mill process water is comprised of machine effluent. Table 7 shows an estimated savings of $225,000/month based on municipal waste treatment rates of $0.67/1,000 gal and water costs of approximately $0.20/1,000 gal. Energy savings for the project have not been quantified, but steam production has decreased by 15,000 to 20,000 lb/hour. Assuming an average steam savings of 20,000 lb/hour, with 30% being generated by fossil fuels, annual fuel savings will be $102,000 as shown in Table 8.

CONTINUING CHALLENGE. The future of water recycling in the U.S. pulp and paper industry is bright. The industry has proven technologies it can use to bring about considerable savings in freshwater withdrawal.

Continued research is still needed to bring advanced studies, such as those in closed-cycle, counterflow techniques and state-of-the-art filtration concepts, to the point where they are suitable for the use throughout the industry. The current risks in these programs are high but the anticipated benefits are strong enough to justify investment. The continuing challenge for the industry will be its ability to keep guarding and conserving this precious and limited resource. ■

TABLE 7: **Identification of savings possible with whitewater blending at mill process water inlet.**

	Without recycling	With recycling
Freshwater intake (gal/day)	16,000,000	9,000,000
Monthly freshwater cost	$ 98,000	$ 55,000
Monthly wastewater treatment cost	$366,000	$184,000
Total	**$464,000**	**$239,000**
Net savings: $225,000/month		

TABLE 8: **Fuel savings associated with whitewater recycling to process water inlet.**

Steam rate (R) = 20,000 lb/hour
Fraction of steam generated (F) = 30%
Steam cost (C) = $2.00/thousand lb
Annual operation period (P) = 355 days, 24 hours/day
Savings = R x F x C x P = $102,000/year

C39T-2

PULP & PAPER

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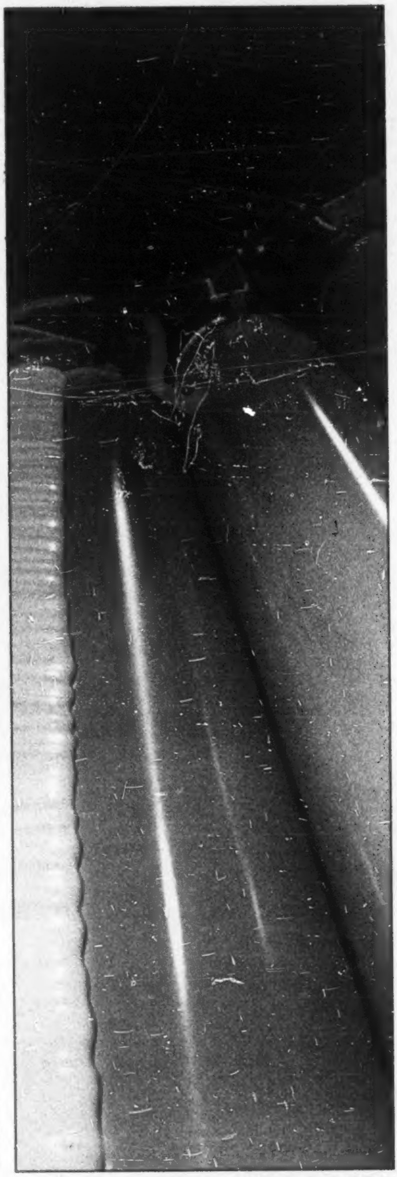

THE COVER

On-machine roll coater at Champion International Corp.'s Deferiet, N.Y., publications paper mill.
(Photo by Mason Morfitt, courtesy of Champion International.)

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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Subscriptions & Address Change: Sent without charge in the U.S.A. & Canada (upon written request) to individuals in pulp, paper, and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $50.00 a year in the U.S. All subscriptions to other countries: $70.00 a year, except Europe and Mediterranean, $80.00 (air service included). Single copy, $4.50, except Buyers Guide, $30.00. Photocopies of articles and complete microform volumes available through University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106.

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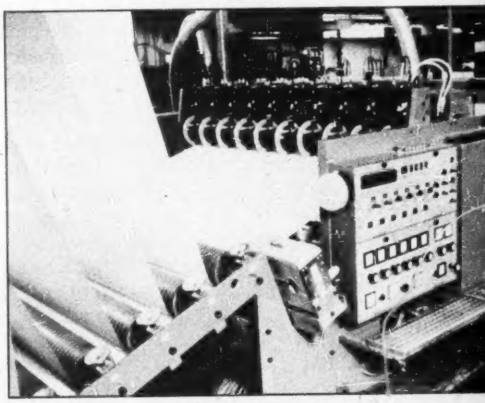

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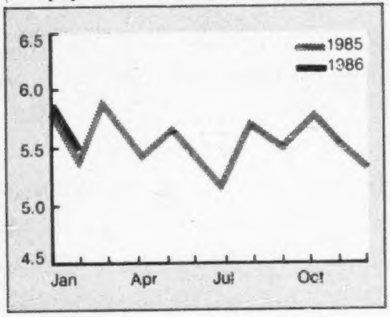
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 5.5 million tons in February, up 1.8% from the same month last year, according to the latest American Paper Institute statistics. The trend position for paper and board production dipped slightly in February to 69.7 million tpy, down from a record 71.0 million-tpy rate in January. Incomplete March data show that trend holding steady, API said. Better export markets helped push paperboard production in February to 2.7 million tons, up 4.1% from a year earlier. Paper production was off a slight 0.4%.

Among major grades, uncoated free-sheet continued to strengthen, with shipments up 7.6% compared with last year. Coated paper was off compared with a strong February 1985, but shipments have strengthened compared with the weak second half of 1985. All of the paperboard grades were up sharply compared with last year, and production of kraft linerboard for export jumped 29.1%. February box shipments rose 5.3% over last year.

Canadian newsprint shipments totaled 696,000 metric tons in February, down 1.8% from last year, while operating rates dropped to 94%, the Canadian Pulp & Paper Assn. said. Pulp shipments climbed 20.9% to 589,000 tons. ■

PAPER & PAPERBOARD PRODUCTION[1]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Newsprint	Feb.	434	−2.9	5,383	−2.0
Uncoated groundwood (s)	Feb.	114	−4.2	1,451	−1.3
Coated paper (s)	Feb.	489	−1.8	6,060	−5.0
Uncoated free sheet (s)	Feb.	808	7.6	10,179	9.8
Other printing/writing	Feb.	110	−5.2	1,364	−3.3
Total packaging and other paper (s)	Feb.	405	−6.7	5,043	−5.2
Tissue	Feb.	191	−51.9	4,911	1.2
Total paper	**Feb.**	**2,751**	**−.4**	**34,390**	**.9**
Unbleached kraft paperboard	Feb.	1,325	3.4	16,714	3.5
Semichemical medium	Feb.	416	4.0	5,155	5.1
Bleached paperboard	Feb.	337	5.6	4,150	7.3
Recycled paperboard	Feb.	642	5.1	7,935	5.6
Total paperboard	**Feb.**	**2,719**	**4.1**	**33,954**	**4.7**
Total U.S. paper and paperboard output	**Feb.**	**5,470**	**1.8**	**68,344**	**2.8**

PULP, WASTEPAPER & FIBER[2]

Total U.S. woodpulp production	Jan.	4,846	5.5	58,154	5.5
Market pulp production	Jan.	622	7.4	7,469	7.4
Wastepaper consumption at paper/board mills	Jan.	1,400	6.0	16,802	1.7
Pulpwood consumption (cords)	Jan.	9,208	24.2	110,496	24.2

CONVERTED PRODUCTS STATISTICS[3]

Corrugated box shipments (billion ft²)	Feb.	21.306	5.3	45.381[6]	4.4
Containerboard inventories at U.S. box plants and mills	Feb. 1	2,489	−14.0		

INTERNATIONAL TRADE[2]

U.S. paper imports (including products)	Jan.	936	4.5	11,237	4.5
Imports of Canadian newsprint	Jan.	289	−54.4	3,463[6]	−18.1
U.S. paper exports (including products)	Jan.	362	6.2	4,340	6.1
Exports of unbleached kraft linerboard	Feb.	151	29.1	1,946	32.5
Exports of woodpulp	Jan.	368	22.3	4,410	22.2
Norscan pulp inventories[4]	Feb. 28	1,331	−29.3		
Norscan pulp operating rates[4]	Feb.	94%	86%	75%	90%

CANADIAN STATISTICS[5] *(reported in metric tons)*

Total newsprint shipments	Feb.	696	−1.8	1,409[6]	−2.1
Operating rates	Feb.	94%	97%	94%	97%
Inventories held by U.S. consumers	Feb. 28	1,452	−3.2		
Other paper/board shipments	Feb.	270	9.3	559	12.0
Woodpulp shipments (export only)	Feb.	589	20.9	1,152[6]	14.1
Operating rates	Feb.	95%	95%	91%	91%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

COATED GROUNDWOOD PAPER: Market in balance until new capacity comes onstream

Grade structure:
Coated groundwood papers consist of a basestock made from at least 10% mechanical pulp, with the balance being chemical pulp and fillers. About 85% of coated groundwood output falls into the No. 5 coated class, and the rest is No. 4 coated, which has higher brightness and frequently has a higher basis weight.

Most coated groundwood is made in the 32- to 50-lb range (25 × 38-in., reams of 500), although some paper as light as 30 lb and as heavy as 70 lb is produced. End uses include magazines, Sunday magazines, catalogs, newspaper inserts, directories and other books, fliers, and other commercial printing. In the case of lightweight coated (LWC) as much as a third of the weight of the paper may be coating.

Production/capacity:
Output was healthy in 1985, although it fell a little short of 1984's record performance. An abundance of paper imported from overseas—brought in by the unusual strength of the U.S. dollar—undercut U.S. output somewhat. Plus, a sluggish domestic economy and excessive customer inventories retarded demand growth.

Capacity rose in 1985 at a relatively slow 3.7% pace. With shipments dropping, however, operating rates plummeted.

In 1986 capacity is scheduled to rise by 5.3%. Aside from a 24,000-short-ton rebuild at Pentair Inc.'s Niagara, Wis., mill in the first half, virtually all of the increase is scheduled for July and later, including Bowater Inc.'s 197,000-tpy machine at Catawba, S.C., in July and International Paper Co.'s 200,000 tpy of capacity to be converted from newsprint this autumn. Meanwhile, Repap Enterprises Inc. is planning to start up a new 181,000-tpy machine at Miramichi, N.B., in June 1986.

Outlook:
Any gains to be made in the coated groundwood market this year depend on the strength of the U.S. economy since customer inventories by early 1986 were down to a minimal level.

Producers are hoping for a very robust economy this year to help them absorb the big bulge of new capacity coming onstream in 1986 and 1987 in North America and western Europe.

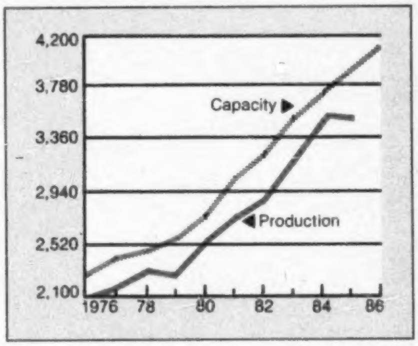
The effects of the new capacity won't be felt in the U.S. this year much before the fourth quarter. Startup tonnage will undoubtedly be showing up in pressrooms during the summer, with sharply discounted prices. But the volumes won't be significant before the end of the year.

Most observers anticipate a pickup this year in shipments to catalog producers and magazines. So with good growth in the economy, the market should see healthy paper demand and improving operating rates throughout most of the second half.

Prices:
Prices were cut in February 1986 to late 1984 levels, and mills were trying to hold the line against further discounting going into the spring. Typical pricing trends ($/short ton for 34-lb roto paper, year-end except 1986, which is first quarter) are: 1973, $285; 1974, $400; 1975, $399; 1976, $460; 1977, $533; 1978, $582; 1979, $671; 1980, $735; 1981, $760; 1982, $760; 1983, $782; 1984, $890; 1985, $931; 1986, $902. Offset prices average about $10/ton higher.

Markets:
About 62% of all coated No. 5 goes to magazine publishers, and another 16% goes to commercial printers. An additional 17% is shipped directly to catalog and directory printers. Other end uses for coated groundwood paper include books. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1984	1985	1986e
Production[1]	3,566	3,536	3,746
Capacity[2]	3,766	3,907	4,116
Utilization rate	94.7%	90.5%	91.0%
Imports	325	375	350
Exports	44	37	35
Apparent U.S. consumption	3,847	3,874	4,061
lb/capita	32.67	32.58	33.83
GNP ratio	2.35	2.31	2.35

e = Estimate.
1. *P & P* estimate.
2. American Paper Institute capacity survey.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Champion	666	16.2
2. International Paper	450	10.9
3. Consolidated	385	9.4
4. Boise Cascade	289	7.0
5. James River[1]	282	6.9
6. Blandin Paper	280	6.8
7. Mead	268	6.5
8. Pentair	210	5.1
9. Midtec Paper	200	4.9
10. Weyerhaeuser	186	4.5

Market share of top five companies:
50.3%

Market share of top ten companies:
78.1%

Total U.S. capacity (1986):
4.116 million short tons

1. James River capacity consists of Crown Zellerbach Corp. mills scheduled to be acquired in April 1986.

MARKET PULP

Weyco Canada plans to buy Prince Albert Pulp

Weyerhaeuser Canada Ltd. will spend C$498 million to purchase and expand Prince Albert Pulp Co. Ltd. under the terms of a memorandum of understanding signed by Grant Devine, Saskatchewan's Premier, and David McInnes, Weyerhaeuser Canada's president.

To be included in the buy are a bleached kraft market pulp mill at Prince Albert, Sask., with capacity for 280,000 metric tpy, the Bodmin sawmill at Big River, Sask., a chemical plant at Saskatoon, Sask., and timber rights related to the pulp mill and sawmill. Weyco has agreed to pay $248 million for the assets, financed by a government-held debenture for that amount, to be repaid with interest over an expected 20-year period. The present owner of Prince Albert, Crown Investment Corp., will keep a sawmill in Meadow Lake, Sask.

In addition to purchasing Prince Albert, Weyerhaeuser has agreed to spend $250 million to modernize and expand the pulp mill and build a new 200,000-short-tpy uncoated free-sheet paper mill at the site. The new mill would be the second-largest uncoated free-sheet mill in Canada, after Domtar Inc.'s 318,000-metric-tpy mill under construction at Windsor, Que.

If the project is approved, construction of the new Prince Albert mill will begin this summer, for completion in 1989. Most of the paper from the new facility will be sold on the export market, Devine said, and Weyerhaeuser Paper Co. will handle sales in the U.S.

The softwood and hardwood kraft pulp mill will be modernized to produce a higher percentage of hardwood pulp, and capacity is expected to climb to about 310,000 metric tpy. Increased hardwood pulping will allow the mill to take advantage of underutilized aspen timber in the area. Work on the pulp mill will begin immediately following completion of the sale.

In addition to supplying the new paper mill, a significant share of pulp production will continue to be sold in the U.S. and offshore markets by Weyerhaeuser Paper's Pulp Div., the company said.

Financing for the new paper mill and the pulp mill expansion will be one third through direct investment by Weyerhaeuser Canada, one third through debt guaranteed by Weyerhaeuser Co., and one third through Weyerhaeuser Canada debt guaranteed by the provincial government.

Latest to integrate. Weyerhaeuser Canada's proposal is the latest in a growing list of projects to convert unprofitable market pulp mills to higher-value paper production *(see table)*. Georgia-Pacific Corp. converted its Port Hudson mill at Zachary, La., last year, and Hammermill Paper Co. will complete a conversion project at Selma, Ala., this summer. Champion International Corp. has proposed an uncoated free-sheet machine for a market pulp mill recently started up at Quinnesec, Mich. In Canada, Repap Enterprises bought Boise Cascade's 500-tpd market pulp mill at Newcastle, N.B., last year and will use about 30% of its output to supply a new lightweight coated paper mill at an adjacent site.

The idea of integrating the Prince Albert facility is not new. The mill had been studying the possibility of installing a paper machine for several years, with attention focused most recently on the addition of either a LWC or supercalendered groundwood machine. Earlier options had centered on an aspen mechanical pulping line and a possible newsprint mill.

Sharp market impact. One observer estimates that the Weyerhaeuser proposal would cut Prince Albert's uncommitted market pulp output by half, given the demands of the new paper machine and the possibility that pulp would be shipped to other Weyco mills. The loss of uncommitted Prince Albert pulp would have a sharp impact on independent paper makers in the midwestern U.S. since Prince Albert has been one of the

TABLE 1: **Examples of forward integration in the North American market pulp industry (000 short tpy).**

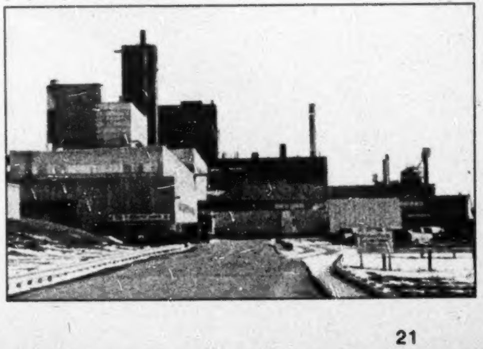
Company/ mill location	Estimated loss of chemical market pulp capacity	Paper/board grade to be produced	Completion date
Georgia-Pacific Corp. Port Hudson, La.	195[1]	230 UFS	1986
Repap Enterprises Inc. Newcastle, N.B.	55[2]	200 LWC	1986
Bowater Inc. Catawba, S.C.	60	197 LWC	1986
Scott Paper Co. Skowhegan, Maine	140	215 CFS	1986
Boise Cascade Corp. Wallula, Wash.	106	110 UFS	1986
Hammermill Paper Co. Selma, Ala.	140[1]	185 UFS	1987
Weyerhaeuser Canada Ltd. Prince Albert, Sask.	140[1]	200 UFS	1989

1. Net of pulp mill expansion. 2. About 55,000 tpy of pulp from the Nelson-Miramichi, N.B., stone groundwood market pulp mill will also be used.

UFS = Uncoated free-sheet; LWC = Lightweight coated; CFS = Coated free-sheet.

Source: *Pulp & Paper Week* estimates; Whitman Associates Inc.

BELOW: **Weyco plans to spend C$498 million to buy Prince Albert Pulp and convert it to higher-value paper production.**



largest pulp suppliers to that market, he said.

The new paper mill could also have a significant impact on the uncoated free-sheet market. The Prince Albert mill enjoys low fiber and energy costs, and the mill would be well positioned to take advantage of weakness in the Canadian dollar and the lowering of tariffs after next year. The new mill would add about 35% to Weyerhaeuser's fine paper capacity, raising the total to approximately 2,200 short tpd.

The prospect of continued losses was behind Prince Albert's decision to sell the mill, which had been up for sale for several years with no takers. Losses totaled $47 million over the past five years, he added, and under present conditions he estimated that there could be a further $100-million loss by 1990. ■

Champion closes part of Pasadena pulp and paper mill

Champion International Corp. will permanently shut down a paper machine, a pulp dryer, and a pulp line at its printing paper mill in Pasadena, Texas, on May 19. The paper machine to be idled, one of four at the mill, is No. 25, a 60-tpd uncoated free-sheet unit. No. 21 pulp dryer will also be closed down, effectively removing the mill from the market pulp business, according to a mill official. Pasadena currently produces about 300 tpd of dried pulp, some for sale on the market and some for transfer to other Champion mills or for internal use at Pasadena.

The older of the mill's two pulp lines will also be shut down, idling three of the facility's nine batch digesters and No. 6 recovery boiler. As presently configured, the mill runs pine on one pulp line and hardwood on the other. After the shutdown, the mill will alternately run pine and hardwood on a single line. However, both bleach plants will continue to operate.

Built in 1937, the Pasadena mill was the first in Texas to make fine paper from southern yellow pine. Current production at the mill is 850 tpd bleached kraft pulp and 750 tpd coated and uncoated free-sheet papers. The mill has been unprofitable for the past several years, and losses for 1986 were projected at several million dollars. ■

ACQUISITIONS/MERGERS

National Gypsum and Genstar spur bidding

When shareholders in building products companies receive a buyout offer these days, they may be well advised to wait until the takeover price is high enough to suit them. Owners of National Gypsum Co. and Genstar Corp. found this method effective.

Although the proposed $1.1-billion takeover of National Gypsum ranked among the top ten leveraged buyout offers of 1985, Wickes Cos. upped the ante to $1.228 billion. Wickes Cos., with interests in lumber and building materials, home furnishings, clothing, and hosiery, offered to pay $54.00/share in cash for the 22.8 million National Gypsum shares outstanding.

Wickes called its all-cash offer "superior" to the leveraged buyout offer of $41.00/share cash plus $17/share face value of a new issue of redeemable discount debentures. This prompted National Gypsum's management to increase its bid to $1.69 billion, or $46/share in cash and $28/share in discount debentures. (The 18-year debentures would earn no interest during the first five years but would earn 15.5% annual interest for the remaining term.

In 1985, when National Gypsum's senior management began the leveraged buyout attempt, it was generally viewed as an effort to foil a takeover move by the Belzberg family, which at that time was acquiring a large stake in the company (*P&P*, Jan., p. 23). Originally, the buyout was set at $40.50/share plus the $17 debentures. Management later sweetened the offer to $41.00/share.

Through Gold Bond Building Products Div., National Gypsum runs five paper mills, with capacity for 1,000 tpd of gypsum board liner and 140 tpd of boxboard, located in Anniston, Ala., Stockton, Calif., Pryor, Okla., Kalamazoo, Mich., and Milton, Pa.

Another company, Genstar Corp., may not get a chance to capitalize on the sweetened takeover bid it received from Imasco Ltd. The Finance Committee of the Canadian House of Commons has unanimously urged the Canadian government to oppose the takeover because it would put Canada Trustco Mortgage Corp., Canada's largest trust company, under the control of a "nonfinancial institution." Imasco's original unsolicited bid offered C$54.00/share, then C$56.00, and reached C$58.00 to ensure that Genstar management would not fight the takeover. The $58/share all-cash offer, amounting to C$2.34 billion, expired on Apr. 25. ■

Crown Zellerbach, James River start the ball rolling

The long-awaited stock exchange between Crown Zellerbach Corp. and James River Corp. began last month. Shareholders of CZ common can exchange each share for an interest in the timberland, container, and computer services companies that will become part of Sir James Goldsmith's empire, or they can get a 1.0682 share in James River.

The offer is contingent on James River being tendered at least 80% of the 17.6 million CZ shares not owned by Goldsmith. James River will exchange up to 22.6 million shares of its stock to ensure that this happens.

Those who don't go with James River will receive one share each of Cavenham Forest Industries Inc., Eczel Corp., and Gaylord Holdings Ltd., plus $6.65 in cash for each CZ share. Goldsmith will swap his 48% stake in CZ for control of those companies. ■

Cascades purchases paper machines from Nitec Paper

Cascades Inc. announced the acquisition of paper machines, plus some other equipment and machinery, at Nitec Paper Corp.'s Niagara Falls, N.Y., mill (idle since 1982) for C$1.75 million. Cascades said that it plans to convert two of the printing and writing paper machines to linerboard and corrugating medium. The tissue machines will probably be scrapped.

The Niagara mill, a subsidiary of Repap Enterprises Inc. of Montreal, Que., has capacity to make 230 tpd of printing and writing papers and 115 tpd of tissue paper. The cost of conversion, other changes, and startup is estimated at C$10 million. The final plans, however, depend on many factors, including purchase of mill buildings owned by the city of Niagara Falls and agreements on antipollution systems, energy costs, and government aid with employee training. ■

OUTLOOK

Competitive U.S. market seen for paper grades

Total U.S. demand for paper grades will reach 54.2 million tons in 1995 compared with the 1986 level of 44.8 million tons, according to a new study by Communication & Information Services (CIS). Demand is forecast to increase at a 2.3%/year rate during 1986-95 vs a 4.3% annual rate during 1976-85.

In addition to slower growth, the "U.S. market for paper grades will be highly competitive over the next decade," according to the *Long-Term Report—1986-1995: U.S. Demand for Paper Grades in a Competitive U.S. Market*. "U.S., Canadian, and offshore producers will continue to fight for shares of the world's largest printing and writing papers market. Imports of printing and writing grades will increase to 5.9% of total new supply in 1995 compared with 4.8% in 1986 and 1.5% in 1976."

Coated papers' new supply is forecast to grow at a 4.0%/year rate and reach 9.4 million tons in 1995, an increase of 2.7 million tons over the decade. Coated free-sheet grades are expected to show higher growth rates than those for coated groundwood papers. Almost no growth will occur in coated one-side paper due to poor performance in the label and wrapping markets, according to the Walnut Creek, Calif., consulting firm.

Uncoated free-sheet demand will increase by 3.6 million tons over the decade, reaching 14 million tons in 1995. This 3.5%/year rise will be fueled mainly by continued strong growth in shipments of copy and forms bond grades.

Uncoated groundwood demand is projected to reach 4.0 million tons in 1995, with insert and forms end uses driving much of the 4.4% annual growth. Supercalendered grades will account for a larger share of the groundwood papers market as these grades replace machine-finished papers in several applications.

Newsprint demand will reach 15.2 million tons in 1995, up from 13.1 million tons in 1986. Imports from Canada will lose slightly more of the U.S. market. Newsprint quality requirements will improve as standard newsprint grades compete with upgraded rotonews and SC sheets in non-newspaper applications and as the use of color increases following the lead of *USA Today*.

U.S. production of packaging and industrial grades is forecast to fall 2.2%/year over the next decade. A loss in market share by bags and sacks to plastics will have a major impact on the demand for unbleached grades, which will drop from 3.7 million tons in 1983 to 2.4 million in 1995. The share of plastic in large grocery sacks is projected to increase from 4% in 1982 to 75% in 1995, and its share for smaller grocery bags will surge to 60% in 1995.

Demand for tissue grades will slow to a 1.7%/year rate over the 1986-95 period compared with a 2.3% rate over the previous ten years. Total tissue new supply will reach 5.8 million tons in 1995 vs 5.1 million tons in 1986. Commercial and industrial tissue demand will grow 3.4%/year vs 0.8% for consumer grades. ■

TOP: **U.S. demand for paper grades (average annual change in demand).** *BOTTOM:* **Summary of end use consumption for printing and writing grades (average annual change in new supply).**

	1976-85	**1986-95**
Uncoated groundwood	7.4%	4.4%
Coated paper	8.2	4.0
Uncoated free-sheet	6.7	3.5
Bristol	1.0	2.3
Tissue	2.3	1.7
Newsprint	3.5	1.7
Packaging/ industrial	1.2	−2.2
Total	**4.25%**	**2.3%**

	1976-85	**1986-95**
Business forms	8.6%	6.3%
Inserts	11.4	6.2
Catalogs	12.3	5.1
Office reprographics (copy)	7.1	4.9
Directories	5.1	3.3
Envelope	4.5	3.2
Magazines/ periodicals	6.4	2.9
Commercial printing[1]	6.5	2.8
Books	3.9	2.7
Converting	4.4	2.4
Stationery and tablets	5.0	0.9
Labels and wraps	3.9	−0.2

[1] Includes direct mail and marriage mail use.

Source: Communication & Information Services.

SPECIALTY PAPERS

Hammermill, Rolland making Nocopi paper

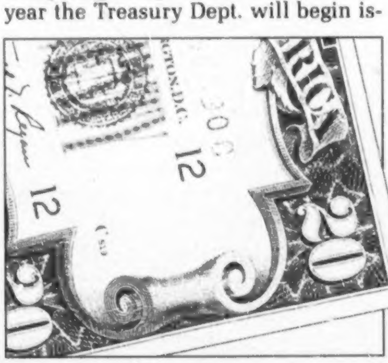
Rolland Inc., Canada, and Hammermill Paper Co., U.S., have been given rights to make the copyrighted photocopy resistant paper of Nocopi International Inc., New York, N.Y., said Nocopi president Norman Gardner.

Meanwhile, Boise Cascade Corp., which had exclusive rights to make Nocopi paper in the Western Hemisphere until Mar. 31, 1986 (*P&P*, Aug., p. 33), decided to get out of that market last fall, according to a Boise spokesman. He noted that Nocopi paper, which is red and produces virtually unreadable photocopies, did not "fit into" Boise's other lines. Boise, however, will continue to make other types of security papers, he added.

Nocopi has patents in the U.S. and Canada for its specially treated paper and is looking for distributors in the U.S. Besides marketing to the general public, it hopes to sell directly to the government. Nocopi is available in shades of red; the darkest is hardest to photocopy. Coated on both sides, it sells for 4¢ to 5¢/sheet or about $4,000/short ton, said Gardner.

Nocopi went public last fall when majority holders led by Gardner and Michael Voticky acquired control and incorporated in Utah as a U.S. firm.

■ After 57 years, U.S. paper currency is getting a face lift. Within a year the Treasury Dept. will begin is-



suing paper money that will be harder to counterfeit on the sophisticated color copier machines now available. The new bills will contain a security thread made of polyester that will be visible when the bill is held up to light but will not reproduce on a copier. The thread will spell out the denomination of the currency, i.e., USA ONE for $1 bills. Crane & Co. Inc. of Dalton, Mass., suppliers of U.S. paper money, developed the system. European currency already uses watermark designs for protection.

Counterfeiters will run into another snag when the Treasury Dept. starts to print "United States of America" around the portrait borders on the bills in minute type invisible to copier machines. The words can be seen with a seven-power magnifying glass. A black market trading in old bills could then spring up. ■

WASTEPAPER

Wastepaper consumption is rising more than exports

J. Rodney Edwards, the American Paper Institute's vice president of the paperboard group, reported that "paper and paperboard mills utilizing wastepaper have recorded strong production totals for the first two months of this year." He expects supply and demand to be in balance in the U.S. during 1986, with domestic demand increasing while export demand has leveled off.

Increased demand for paperboard packaging has improved production schedules at mills producing recycled paperboard and containerboard, Edwards noted. Home building should remain strong because of lower mortgage rates, increasing demand for gypsum wallboard and other building products.

Last year, however, domestic use fell to 16.5 million short tons from 17.2 million tons in 1984, due to lower production at paper and paperboard mills using paperstock as a raw material, said the API. Exports rose 1.6% during that time to 3.3 million tons.

Total collections of recyclable paper in 1985 were down 3.1% from the year before to 19.8 million tons. Old corrugated container collections fell just 0.2% to 9.2 million tons, while domestic consumption was off 0.9% and exports rose 4%. In January, though, domestic consumption rose 6.5% from two years earlier.

Old newspaper collections in 1985 were off 2.5% to 3.6 million tons, and domestic use fell 6.3% to 2.7 million tons. Exports rose 16% during that time to 625,000 tons. In January, domestic consumption was still off 1.1% compared with a year earlier.

Mixed papers consumption by domestic mills was down 3.9% to 1.9 million tons, and exports were off 0.6% to 880,000 tons. Domestic consumption of the high grades fell 9.9% to 3.6 million tons, and exports were off 14.6% to 470,000 tons. The availability and low cost of market pulp during the year was cited as the primary cause for the drop in high-grade paperstock demand.

The API noted that all wastepaper grades were in "ample supply" in 1985, with OCC and old news in oversupply in some areas of the country. Also, export shipments moved from West Coast ports to shipment from East Coast ports—1.125 million tons were shipped from the East last year compared with 873,000 in 1984. ■

TOP: **1985 wastepaper data (short tons).** *BOTTOM*: **1984 wastepaper data (short tons).**

	Consumption at U.S. paper and paperboard mills*	**Exports**	**Total collected**
News	3,014,431	625,631	3,640,062
Corrugated	7,902,275	1,310,876	9,213,151
Mixed	1,898,070	879,825	2,777,895
High grades	3,599,961	469,594	4,069,555
Other	82,510	—	82,510
Total	**16,497,247**	**3,285,926**	**19,783,173**
News	3,194,772	539,431	3,734,203
Corrugated	7,971,702	1,260,845	9,232,547
Mixed	1,974,540	885,478	2,860,018
High grades	3,997,713	549,687	4,547,400
Other	44,265	—	44,265
Total	**17,182,992**	**3,235,441**	**20,418,433**

*Includes consumption at plants making molded pulp and insulation products.
Source: American Paper Institute.

INTERNATIONAL TRADE

Morris Paper reopens as China's first foreign venture

Morris Paper Board Co. is making history as the first foreign manufacturing operation that People's Rep. China has invested in on its own. The 100-tpd Paterson, N.J., uncoated boxboard mill, i.e., the first division of the newly formed U.S. corporation ChinAm Inc. (New Jersey), was expected to reopen in late April after improvements costing about $400,000 are completed, ChinAm representatives said.

ChinAm, a wholly owned subsidiary of Chinese government-owned China National Packaging Corp. in Beijing, China, plans to eventually buy other U.S. firms. However, it is not certain if the growth will be "vertical or horizontal," said Irwin Silberman, vice president of China Tek Inc., which represented CNPC in the purchase and is continuing to advise mill management. When the sale closed on Jan. 2, the mill became ChinAm's Morris Paper Board Div.

ChinAm has made only necessary improvements in all sections of the facility to meet building and other codes and prevent breakdowns once the mill is brought back online, according to ChinAm's associate president and chief engineer, Ji Xing. Xing is also director of CNPC Research Institute in Beijing. Xing and ChinAm's vice president and manager, Shiyan Guo, from the management department of CNPC, are stationed at the mill.

Xing and Guo said that China hopes to learn U.S. business ways to apply to papermaking in China. The mill eventually will employ about 55 workers; most will continue to be organized under United Paperworkers International Union. Xing, Guo, Silberman, plus a superintendent of operations and a head mechanic will

In January, Maine's Dept. of Environmental Protection denied the water quality certification needed to obtain a federal license for construction, stating that the dam would have lowered the dissolved oxygen content of the river below federal standards (P&P, Mar., p. 27). This ruling was criticized by Governor Brennan and other state politicians. Shortly thereafter, GN announced its plans to restructure and scale back, eliminating 1,200 to 1,400 jobs in the next several years. The scale-back will gradually drop the core capacity of the two mills—combined capacity is to decline this year by about 140,000 tons from 838,405 tons of newsprint and groundwood paper. Several paper machines will be shutdown forever.

Asked whether cancelling Big A would affect the modernization of the Maine mills, including the $155-million upgrade of East Millinocket and the rebuild of two newsprint machines, a spokesman emphasized that GN will "still move forward with modernization but only to the extent of present low-cost hydroelectric energy and cogeneration." ■

Supreme Court to hear IP's wastewater dispute

In the latest round of a long-standing fight between Vermont officials and property owners and International Paper Co., the U.S. Supreme Court has agreed to hear arguments in the case. Vermont residents along the southern shore of Lake Champlain have charged that wastewater discharge from IP's 690-tpd bleached pulp and paper mill at Ticonderoga, N.Y., is polluting the lake and thereby damaging property values in their communities.

At issue, in what could be a major environmental test case, is whether citizens of one state have the right to sue over pollution damage produced by a neighboring state. Property owners are suing IP for approximately $120 million in damages in the suit, which was initiated in 1978.

According to Peter Langrock, attorney for the Vermont property owners, no court date has been set, but it is expected that arguments will begin in early fall. The latest ruling was given last November by the Second U.S. Circuit Court of Appeals. The court upheld a federal court decision denying IP's request to dismiss the case.

IP and New York State have been involved in litigation brought by Vermont and the Environmental Protection Agency over Lake Champlain pollution since the late 1960s. At that time, the suit involved sludge discharged from a previous IP mill in the same area.

In November 1973, the Supreme Court ruled in favor of the environmentalists, requiring IP to improve water treatment facilities at the new mill (completed in 1971) and make a $500,000 contribution to Vermont for the future preservation and protection of the lake.

ENVIRONMENT BRIEFS

■ The Environmental Protection Agency announced its intent to list chloroform as a hazardous air pollutant under Section 112 of the Clean Air Act. The EPA alleges that the pulp bleaching process accounts for about 25% of the chloroform emissions in the U.S. and states that chloroform is a known animal carcinogen and probable human carcinogen. The American Paper Institute warned that such a listing would cost the industry over $250 million annually.

■ A nationwide EPA survey has found that very low levels of dioxin have been found in bleached kraft pulp sludges from mills in Maine, Minnesota, and Wisconsin. The pulp and paper industry and the EPA have jointly commissioned the National Council of the Paper Industry for Air & Stream Improvement to begin a study of these sludges and their effects on landfill sites. Regulations for sludges containing dioxin are being planned at the federal and state levels. The EPA proposes prohibiting the land disposal of sludges containing dioxin to 1 ppb. Maine proposes a 100-parts-per-trillion limit.

■ President Reagan and Canadian Prime Minister Brian Mulroney recently reached an agreement to fight acid rain. While details haven't been released, the plan reportedly calls for a $5-billion program to introduce new coal-burning power plants to reduce acid rain. Industry and the U.S. federal government would each contribute $2.5 billion to the program. Meanwhile, two bills are pending in the House of Representatives that would require sulfur dioxide emissions from the U.S. to be reduced by at least 10 million tons over ten years. Emissions now are about 24 million tpy. ■

NEWSPRINT

Newspaper publishers learn to love offshore imports

Last year, U.S. customers imported 365,000 short tons of newsprint from offshore, 75% more than in 1984. Big gainers among the supplier nations included Sweden, up 53%; Norway, up 25%; Finland, up 52%; South Africa, up almost 690%; and the U.K., up by an astronomical percentage from virtually nothing in 1984.

As with previous years, the biggest tonnages came into the Sunbelt. But New York City and Philadelphia both showed up on the list of the ten most important ports of entry. Actually, six of the top ten on that list are on the East Coast, including Miami.

The most significant new factors among the supplier nations are the U.K., shipping the majority of its tonnage into the East and Gulf Coasts, and South Africa, with significant volumes going into New York City, Houston, Miami, and Los Angeles. Scandinavian suppliers represented 70% of offshore imports in 1985, down from 85% in 1984. But Sweden had the largest absolute increase.

Not all of the figures can be taken at face value. Italy's import amount, for example, is considered to be suspect. Observers believe that the Italian import may have been uncoated or coated groundwood paper that was misclassified as newsprint. ■

U.S. newsprint imports—offshore tonnage, 1985 (top ten ports, 000 short tons).

Port of entry	Major countries of origin[1]	Tons
Los Angeles	Norway, Sweden, Finland	87,210
San Francisco	Norway, Sweden	61,190
Houston	Sweden, South Africa	49,511
Philadelphia	Finland, Sweden, Italy*	48,067
Miami	Sweden, U.K.	28,724
New York	South Africa	25,326
Norfolk	Italy*	11,888
Baltimore	—	10,733
Washington	—	9,774
Mobile	Sweden	8,722

1. For import volumes of 5,000 tons or more from a single country, if applicable; in descending order of importance.

*Imports from Italy subject to question—may not be newsprint.

Source: U.S. government figures.

Pigment market in transition; price, availability stable

TABLE 1: **Prices and availability of inorganics for coating, filler.**

Product	Availability 1986	Price 1986	Year-end price increase (%)
Calcium carbonate			
Natural ground, range of grades, bag, ton	Market	98-140	0-4
Natural ground, range of grades, slurry, ton	Market	92-133	0-4
Precipitated, bag, ton	Market	225-265	4-5
Hydrated alumina			
Bag, ton	Market	500-700	0-8
Kaolin, clay, ton, bulk			
High-brightness, No. 1	Market	140-150	4-8
Delaminated	Market	88-95	4-8
No. 1 coating	Market	84-86	2-8
No. 2 coating	Market	65	2-8
No. 3 coating	Market	54	2-8
Calcined	Market	400	4-8
Filler, water-washed	Market	59-60	4-6
Plastic pigment, bulk, lb	Market	0.80-1.00	3-4
Talc, bag, ton	Market	180-200	4-5
Titanium dioxide			
Anatase, lb, dry	Very tight	0.67-0.70	4-10
Anatase, lb, slurry	Very tight	0.69-0.72	4-10
Rutile, lb, dry	Tight	0.70-0.75	4-10
Zinc oxide, lb	Market	0.60-0.80	4-5

Kaolin. In 1985, clays of all grades were produced in every state except Alaska, Delaware, Hawaii, Rhode Island, Vermont, and Wisconsin. Thirty top producers supplied about half the output, and 300 others delivered the rest. Together, these firms operate about 1,100 mines. The paper industry uses kaolin clay, supplied by eight to ten companies with 15 mines. Market value for all clays hit a record in 1985 at $1.1 billion, with kaolin nearly half that. Total clays sold or used by U.S. producers increases 3% in tonnage and nearly 10% in value. Exports increased as well.

Resources of kaolin are primarily located in Georgia, where an estimated 5-10 billion tons lie. Production and price should rise incrementally over 1986, if imports of coated paper remain flat and conversions to alkaline papermaking systems continue slowly. There is some shifting from lower-grade kaolin to higher grades among coated paper producers, but this is a factor of end-user's desire for a higher quality printing surface (i.e., for gloss, ink receptivity improvements). All grades continue at availability.

Calcium carbonate. The paper industry in recent years has been very interested in converting from acid-based forming to alkaline-based forming. The developments are chiefly among fine paper producers, especially at smaller mills. These systems are using between 15% and 20% ash content, which improves sheet life, conserves fiber, and enhances the bottom line for most producers. Alkaline systems have been running abroad for nearly 15 years and in the U.S. for more than a decade. *P&P* estimates that 40 machines now operate alkaline systems, accounting for roughly 10% of white paper production. This trend should persist into the 1990s, especially if end users (such as carbonless copy producers) push for this type of paper.

TABLE 2: **Major end uses for kaolin clay.**

End use	Short tons
Paper	3,375,500
Coating	2,194,075
Filler	1,181,425
Retractories	549,500
Rubber	314,000
Export	2,747,500

Another interesting development is the attempt by one major fine paper producer to locate an online generator at the paper mill. This greatly reduces delivered cost and allows for quick production changes. This may also be just the vehicle that is needed for the larger mills to convert their papermaking systems.

Titanium dioxide. Tight supply will be the situation for titanium dioxide throughout the decade. The reason is limited expansion for domestic producers while users, particularly in the housing and automotive industries, increase sales. Deliveries to paper mills were flat and will remain so if the industry price increases for all grades of TiO_2 go into effect. Production abroad will increase as four new plants are planned for construction during the next two years. Two factors are involved in this development: the possibility of export at current prices and the relaxed environmental guidelines in remote countries. (For a full report on TiO_2 see p. 64).

Other pigments. Many supplementary pigments for coating are available and are used (usually in specialty grades) in papermaking. Plastic pigments are the domain of Dow Chemical since other competition dropped out in 1983. Sources say prices for products will remain under $1/lb and that use is increasing for users who require higher sheet quality. Talc use has continued at a level pace for the last five years, and no significant change is apparent in price, use, or availability. Hydrated alumina producers are additionally concentrating efforts to reach high-quality paper manufacturers, but no price increase is evident. Zinc oxide suppliers anticipate a price increase in their specific market niche.

Among the coating products that have dropped out of sight in the paper market are satin white and urea-formaldehyde. One producer of satin white has stopped production due to small markets in paper and other manufacturing industries, leaving only one company in this field. The urea-formaldehyde suppliers also have left the paper industry because of shrinking deliveries and a too small market. ■

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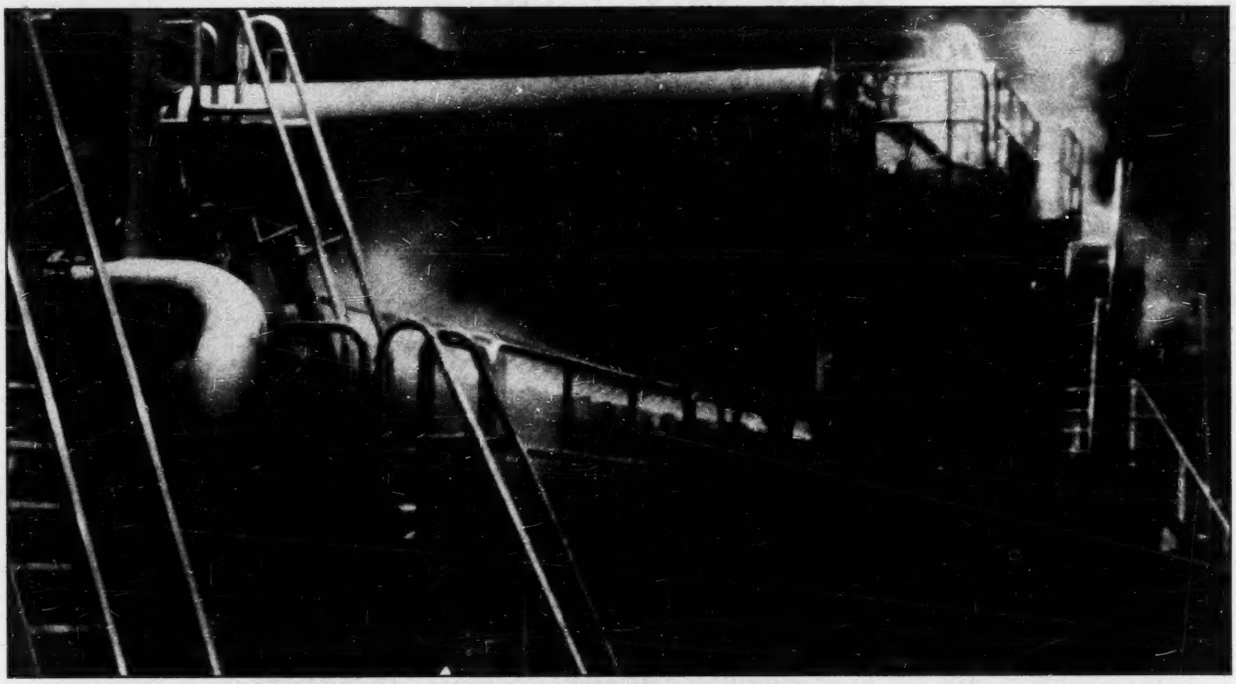

***COVER**: Georgia-Pacific's mill modernization at Monticello, Miss., included the conversion of No. 1 machine to two-ply lightweight linerboard production. See story beginning on page 92.* (Photo by Doug Matyka, courtesy of Georgia-Pacific Corp.)

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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Circulation Department, PULP & PAPER,
500 Howard St., San Francisco, Calif. 94105.
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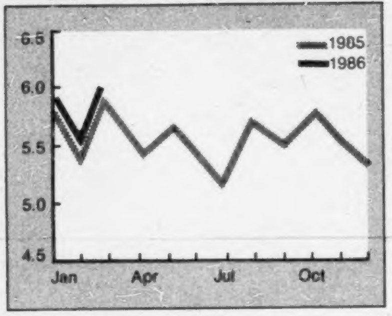
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard in March moved above six million tons for the first time in two years, according to the American Paper Institute, with both paper and paperboard above the record three-million-ton level. March production totaled 6.1 million tons, up 2.5% from the previous year. First-quarter production was also strong, gaining 3.6% over the same period last year. Preliminary data for April show paper and board production following a flat trend about 2.5% above the comparable year-earlier level. The seasonally adjusted annual rate for February and March was 68.9 million tpy.

Among major grades, uncoated free-sheet and tissue were the only paper grades posting gains. Production of containerboard for domestic use was off 0.1% from last March, while corrugated box shipments rose 2.4%. Kraft linerboard exports were up a healthy 46.5% from depressed year-earlier levels.

Canadian newsprint shipments totaled 746 million tons in March, down 7.8% from a year earlier. The March operating rate stood at 89%, compared to 95% last year. Pulp shipments shot up 21.7% to 745 million tons for the month, pushing the operating rate to 97%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Mar.	491	0.4	5,552	−1.2
Uncoated groundwood (s)	Mar.	123	−8.9	1,461	−2.4
Coated paper (s)	Mar.	525	−1.9	6,141	−4.2
Uncoated free sheet (s)	Mar.	889	8.4	10,342	8.9
Other printing/writing	Mar.	108	−21.2	1,340	−10.0
Total packaging and other paper (s)	Mar.	446	−2.0	5,144	−4.1
Tissue	Mar.	431	0.2	4,997	1.1
Total paper	**Mar.**	**3,022**	**0.7**	**35,015**	**1.0**
Unbleached kraft paperboard	Mar.	1,496	−0.3	17,129	2.1
Semichemical medium	Mar.	459	6.7	5,275	5.8
Bleached paperboard	Mar.	378	8.0	4,293	8.1
Recycled paperboard	Mar.	701	1.2	8,062	4.9
Total paperboard	**Mar.**	**3,035**	**4.4**	**34,759**	**4.0**
Total U.S. paper and paperboard output	**Mar.**	**6,057**	**2.5**	**69,774**	**2.5**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Feb.	4,407	1.1	55,521	3.2
Market pulp production	Feb.	589	0.2	7,270	3.8
Wastepaper consumption at paper/board mills	Feb.	1,417	17.5	17,750	14.8
Pulpwood consumption (cords)	Feb.	7,261	4.0	90,846	5.2
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	Mar.	22.567	2.4	67.948[6]	1.1
Containerboard inventories at U.S. box plants and mills	Mar. 1	2,489	−15.9		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Feb.	963	11.1	11,395	7.7
Imports of Canadian newsprint	Feb.	706	9.3	8,190[6]	6.7
U.S. paper exports (including products)	Feb.	349	21.6	4,263	13.2
Exports of unbleached kraft linerboard	Feb.	148	46.5	1,865	21.5
Exports of woodpulp	Feb.	342	53.4	4,257	35.5
Norscan pulp inventories[4]	Mar. 31	1,133	−35.7		
Norscan pulp operating rates[4]	Mar.	89%	94%	86%	90%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Mar.	746	−7.8	2,156[6]	−4.3
Operating rates	Mar.	89%	95%	92%	96%
Inventories held by U.S. consumers	Mar. 31	1,424	−7.2		
Other paper/board shipments	Mar.	498	7.8	1,452	6.5
Woodpulp shipments (export only)	Mar.	745	21.7	1,897[6]	17.5
Operating rates	Mar.	97%	91%	91%	91%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

RECYCLED PAPERBOARD: Market starts to rebound

Grade structure: Secondary fiber makes up most of the fiber furnish of recycled paperboard, which includes the following grades: boxboard, corrugating medium, linerboard, gypsum linerboard, and core, can and tube stock. Recycled paperboard can be produced on either a fourdrinier or a multi-ply paper machine.

Production/capacity: Production was up 0.8% to 7.7 million short tons in 1985 from 1984. Demand began to improve late in the final quarter of 1985 and this continued through the first quarter of this year, with production up 5.6% for the first three months compared with the same period in 1985, according to American Paper Institute (API) figures.

Capacity rose just 1.7% in 1985 from the previous year, keeping the market relatively stable. Mills operated at 84.5% of capacity last year compared with 86.1% in 1984. This year, capacity is expected to rise 2.1% to 9.3 million tons, which should keep mills running at about an 85.8% rate.

Possible reactivation or dismantling of several mills that have been idle for more than a year could change the industry capacity outlook over the next couple of years. Federal Paper Board Co. Inc. had a tentative agreement with a Hong Kong firm in May to purchase machinery from its 85,000-tpy Marseilles, Ill., mill for shipment overseas. Other recycled board mills are also up for sale, including American Packaging Corp.'s Miamisburg, Ohio, mill, Big M Paperboard Inc.'s Palmyra, Mich., mill, and Whippany Paperboard Co.'s Whippany, N.J., mill. Harriman Paperboard Corp.'s idle Harriman, Tenn., mill is under a tentative agreement to be sold. Two other mills—International Paper Co., Durham, Pa., and V. Ponte & Sons, Clifton, N.J.—were bought over a year ago and not restarted.

Outlook: Boxboard demand picked up in the first quarter, but production was slowing down and backlogs had begun to shrink at some mills in April and May. Some attributed this to the normal summer slowdown. Others blamed price increases attempted in April and May but postponed until summer after buyers resisted.

Recycled paperboard production is expected to increase to 7.95 million tons in 1986, 3.2% ahead of 1985. Most market observers were heartened by the strong markets for solid bleached sulfate (SBS) and solid unbleached sulfate (SUS) boards: prices for both were successfully raised in April and May. It was thought that this would boost recycled prices this summer. The need for a recycled price increase was becoming more imperative as wastepaper prices continued to rise in the second quarter of this year. Clay-coated board prices have eroded continually since the peaks of 1981.

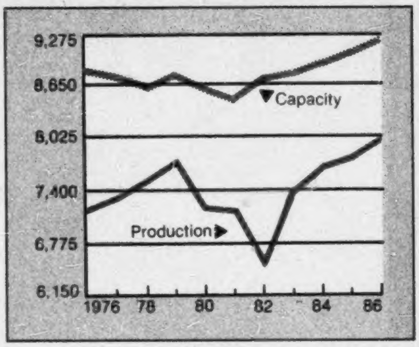
One obstacle to price relief is a large amount of capacity set to come online in the next three years. According to API, recycled capacity will rise 5%, or 448,000 tons, reaching 9.3 million tons by 1988. This will mark the highest three-year increase in ten years. Almost all of the additions, though, are in containerboard, a market which should show stronger growth because of limited expansion of kraft or semichemical mill capacity.

Prices: Prices on all grades of recycled board should increase this year. Clay-coated board prices will be helped by increases already implemented on competing SBS or SUS folding carton boards. Gypsum liner will be strengthened by the pickup in the housing market, which—together with improvement in other industries and the export market—will also bolster prices for other grades.

Clay-coated 20-pt folding carton boxboard (rolls), $/short ton, year-end: 1975, $257; 1976, $262; 1977, $284; 1978, $305; 1979, $355; 1980, $380; 1981, $400/425; 1982, $380/425; 1983, $370/425; 1984, $375/425; 1985, $350/400. Bending 20-pt chipboard (rolls), $/short ton, year-end: 1975, $204; 1976, $212; 1977, $219; 1978, $225; 1979, $260; 1980, $260/275; 1981, $270/280; 1982, $280; 1983, $280/300; 1984, $300; 1985, $300.

Markets: Market demand for recycled paperboard grades, measured by their capacity share, is: folding boxboard, 29.3%; setup boxboard, 3.4%; corrugating medium, 17.3%; gypsum linerboard, 14.4%; linerboard, 6.3%; container chipboard and filler board, 2.4%; other paperboard, 26.9%. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1984	1985	1986e
Production[1]	7,637	7,701	7,950
Capacity[1]	8,896	9,077	9,268
Utilization rate	86.1%	84.8%	85.8%
Imports	69	68	80
Exports	169	246	375
Apparent U.S. consumption	7,537	7,523	7,655
lb/capita	63.8	63.0	63.6
GNP ratio	2.16	2.11	2.09

e = Estimate.

[1] American papper Institute data.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. CCA	628	6.9
2. Sonoco Products	600	6.6
3. Newark Group[1]	568	6.3
4. Jefferson Smurfit	543	6.0
5. Caraustar	450	5.0
6. National Gypsum[2]	400	4.4
7. Waldorf[3]	362	4.0
8. Rock-Tenn	307	3.4
9. Federal Paper[4]	300	3.3
10. PCA	210	2.3

Market share of top five companies:
30.7%

Market share of top ten companies:
48.1%

Total U.S. capacity (1986):
9.077 million short tons

[1] Includes 68,000-tpy Lawrence Paperboard Corp. mill.

[2] Includes idle Kalamazoo, Mich., gypsum linerboard mill.

[3] Bought former St. Regis recycled board mill in St. Paul, Minn., and Battle Creek, Mich., from Champion International last July.

[4] Does not include 85,000-tpy Marseilles, Ill., recycled board mill.

MARKET PULP

Millar plans greenfield market CTMP facility

Millar Western Industries Ltd., a family-owned lumber company based in Edmonton, Alta., said it plans to build a greenfield bleached market chemithermomechanical pulp (CTMP) mill at Whitecourt, Alta.

Financing for the C$185-million project is in place, and preliminary engineering has already been completed, according to MacKenzie Millar, president of Millar Western Pulp. Final engineering for the new mill should be completed by Aug. 1 so that construction can start at the beginning of the fourth quarter. If all goes according to plan, the mill will begin production in the third or fourth quarter of 1988.

The bulk of the financing will come from the provincial government in the form of an interest-bearing, $120-million debenture. Alluding to the controversy surrounding Canadian government subsidies, particularly in the area of stumpage fees, Millar stressed that the project will not receive any government grants or interest-free loans.

Fine-tuned pulp. The new mill will be one of the largest of its kind in the world, with capacity for 177,500 a.d. metric tpy. Depending on product mix, the mill will produce 500 to 550 tpd of CTMP on its two independent lines. New fiber fractionation technology will allow the mill to "fine-tune" its pulp between the two lines for different end uses, Millar said. For example, short fibers could be extracted from one line and sent to the other to produce pulp for printing and writing paper, while longer fibers from the second line could be sent to the first to make pulp more suited for tissue and toweling production. The pulp will be fully bleached, with a brightness of around 80 on the ISO scale.

The mill will be able to vary its product mix between hardwood and softwood. From 50% to 75% of the mill's wood supply will be softwood chips from local sawmills, with aspen logs making up the difference. Millar's own sawmill in Whitecourt will supply about 40% of the CTMP mill's chip needs.

Given the ability to fine-tune its product, Millar Western expects to produce CTMP for a wide range of end uses, including printing and writing papers, tissue and toweling, and fluff. Potential markets include Japan, Europe, and the U.S., which is expected to be the mill's largest market.

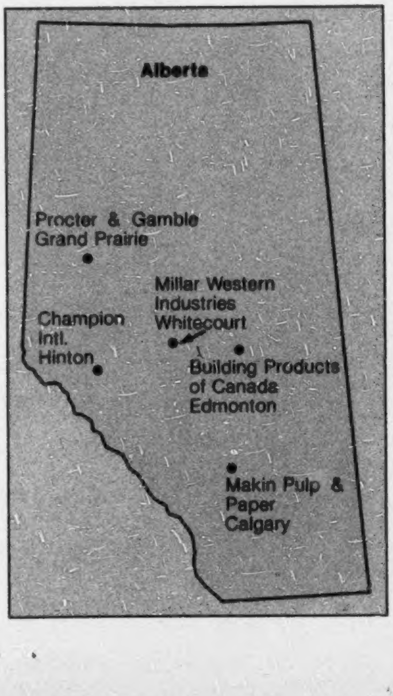
Marketing potential. CTMP already has a following among printing and writing paper producers in Europe, according to Millar, with most CTMP mills sold out. Some CTMP grades are even selling at a premium to northern bleached softwood kraft pulp, he added. Japanese printing and writing producers should also be willing customers, Millar and other observers say.

But the U.S. printing and writing market may be a harder nut to crack. While U.S. producers are interested, the market for CTMP is more potential than actual at this point, Millar acknowledged. Papermakers will need help to come up with products to take advantage of CTMP's special qualities, such as its high bulk, he added.

The market for CTMP is more established in tissue and toweling, but cheap eucalyptus kraft pulp has recently gained a following in this area among major U.S. producers, putting pressure on other grades. Millar feels, however, that the price of eucalyptus will rise as it becomes more popular, and that CTMP will find a niche under it.

Too much capacity? Another factor is the increasing popularity of market CTMP, which has been touted in several studies as one of the best ways to take advantage of Canada's cheap energy/expensive wood cost structure. Last year, market mechanical pulp capacity was expected to grow from 533,000 tpy in 1985 to 643,000 tpy in 1987, according to the Canadian Pulp & Paper Assn. That 23% increase included Tembec Inc.'s new 100,000-tpy mill at Temiscaming, Que., which is expected to start up soon.

Several other projects have been announced since then, however, and capacity could climb to 1,068,000 tpy by 1988—a 100% increase in just three years. Besides the Millar Western mill, new projects include Consolidated-Bathurst Inc.'s plan to add a bleach plant at its Bathurst, N.B., mill. Plus it will market an additional 80,000 to 85,000 tpy of bleached CTMP no longer required by its British newsprint mill in the domestic market beginning next fall. In addition, Cascades Inc. plans to reopen the for-

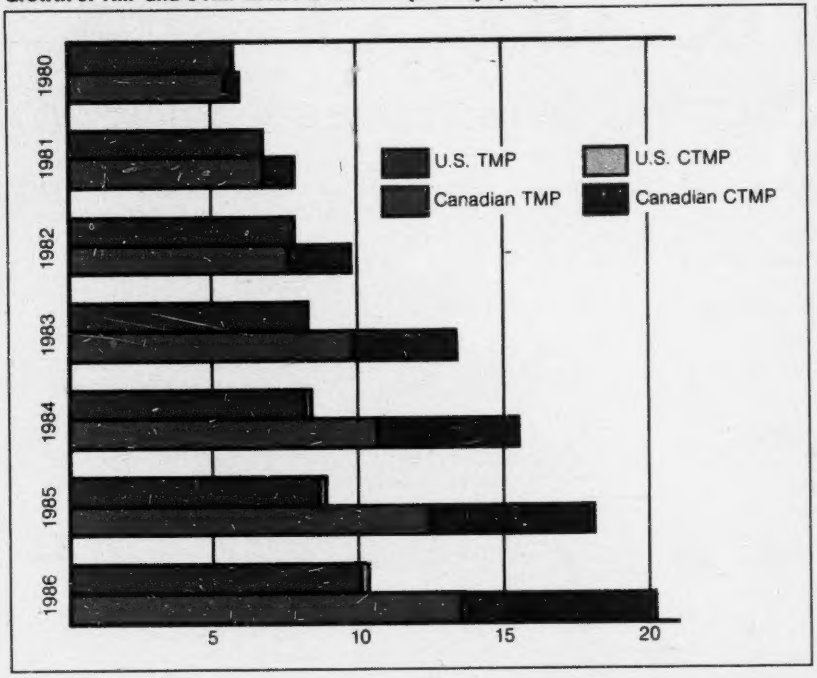


TOP: **CTMP projects planned at market pulp mills.** *BOTTOM:* **CTMP projects at paper mills.**

Company	Capacity (metric tpy)	Startup year
Tembec Temiscaming, Que.	100,000	1986
Cascades Port Cartier, Que.	160,000	1988
Fibreco Export B.C.	170,000	—
Con-Bath Bathurst, N.B.	85,000*	1987
Millar Western Ind. Whitecourt, Alta.	177,500	1988
MacBlo Powell River, B.C.	250,000	1986
Con-Bath Shawinigan, Que.	214,800	1987
Makin Brittania Beach, B.C.	135,000	1988

*Available for market after bleach plant expansion.

Growth of TMP and CTMP in North America (short tpd).



mer ITT Rayonier mill at Port Cartier, Que., as a 160,000-tpy market CTMP mill in 1988. The mill, which has a pulp dryer, will reportedly concentrate on fluff pulp. ITT Rayonier will market most of the output.

Another 170,000 tpy could be added to the total by Fibreco Export Inc., which may build a market CTMP mill in interior British Columbia. Fibreco is still studying the project and expects to make an announcement in about six months. ■

Champion studying project to double size of Hinton mill

Champion Forest Products (Alberta) Ltd. will conduct a C$3-million feasibility study of a project to modernize and expand its Hinton, Alta., market pulp mill, CFPA president Ken Hall has announced. The study will focus on engineering and funding for a project that would double the size of the existing mill, cost more than C$300 million, and provide 400 to 450 additional direct jobs.

"The modernized and expanded mill would use the latest technology to ensure the continued success of the operation on a cost competitive basis," the company said. The Hinton mill presently produces 206,000 metric tons of bleached softwood kraft pulp and 75 million bd ft of lumber per year. Annual sales of these products amount to approximately C$130 million.

Champion said that it is working cooperatively with the provincial and federal governments and the local community to establish the viability of the project. The Hinton mill has been in continuous operation since 1957 and was acquired by Champion from St. Regis Corp. in late 1984. Near the time of its acquisition, St. Regis had been considering Hinton as one of several possible sites for a proposed lightweight coated paper machine. However, Champion did not indicate that it had any plans to add papermaking capacity.

Due to the success of an intensive forestry program, the timber supply available from the company's Alberta forest management area has continued to increase. Some of this additional timber would be required for the expansion program.

Last year, Hinton shipped about 180,000 tons of bleached softwood kraft pulp, of which 175,000 went to the U.S. market. Of this, about 70,000 tons were market pulp and the remainder apparently was "tied" pulp utilized in Champion International's U.S. paper mills. ■

Tight pulp market precursor to price hikes next quarter?

North American market pulp is in tight supply and there is growing speculation about a further attempt to increase prices in either the third or fourth quarter. Industry observers say that southern pine and hardwood grades are in almost short supply and new Apr. 1 price levels of $420/metric ton for pine, $385 for northern hardwood, and $380 for southern mixed hardwood have generally taken hold. Northern bleached softwood kraft prices have also risen by $25/ton or more, although a number of suppliers are still selling below the new $450 list price. Some top-tier producers are at the new list price, however, and the price is expected to firm.

The sharp pulp market turnaround was triggered by downtime taken late last year and hedge buying in anticipation of recent price increases. Most industry observers, however, believe that customer inventories in the U.S. are still at low-to-moderate levels. Production of uncoated free-sheet papers has been strong, although coated and specialty grades have been showing some weakness.

Supply of southern pine paper pulp has been tightened by strong fluff demand, which reportedly has caused some major southern mills that produce both grades to swing to diaper pulp, according to industry observers. The surge in demand for fluff is probably related to intense competitive activity in the diaper market, where Procter & Gamble is rolling out its new superabsorbent diapers. More diapers are going into distribution channels, and consumers may be buying more—trying out a box of the new thin diapers along with their regular brands.

Inventories plunge. North American and Scandinavian inventories of chemical paper-grade market pulp dropped 181,000 metric tons in March to end the month at 1.13 million tons—their lowest level since June 1984. North American operating rates in March dropped to the low 90% range in March from 98% to 99% in February, while Swedish mills ran at 87% and Finnish mills—affected by a brief national strike—averaged 76%. Brazilian mills averaged 82% for the first two months of 1986, while Iberian mills reportedly took significant downtime. ■

SALES & EARNINGS

First-quarter U.S. paper industry profits dropped slightly

U.S. pulp and paper companies reported a 23.3% drop in earnings on a 1.6% decline in sales for the first quarter due to weak prices in a number of grade segments, according to a *Pulp & Paper* survey of results from 33 companies. But many CEOs predicted that earnings would strengthen over the balance of the year, and some Wall Street investment firms, such as Morgan Stanley & Co., predicted that the first quarter marked the "trough" of the current earnings cycle, and "measurably better profits" are expected for this quarter.

Price weakness from the second half of 1985 persisted in the first quarter and was the major reason for the earnings decline. Plus, several companies reported startup difficulties with new or modernized production facilities. These problems were partly offset by higher income from wood products operations and the sharp drop in the dollar, causing some firming of export prices.

U.S. paper/forest products industry first-quarter results.

Companies	Sales	Change 1986/85	Earnings[1]	Change 1986/85
Boise Cascade	$916,610	−4.3%	$25,000	−24.9%
Bowater Inc.	200,074	−7.6	5,172[2]	−65.7
Champion International	1,122,336	−31.8	22,001	−49.7
Chesapeake Corp.	133,623	64.6	(2,493)	n.m.
Consolidated Papers	161,742	−12.7	23,434	−14.4
Crown Zellerbach	706,200	−7.3	600	−96.9
Federal Paper Board	207,723	35.5	2,413	5.3
Fort Howard	319,439	3.5	36,967	11.4
Georgia-Pacific	1,604,000	1.5	30,000	−38.7[2]
P. H. Glatfelter	70,347	−3.0	10,297	−0.9
Great Northern Nekoosa	487,800	−2.1	11,600[2]	−16.5[2]
Hammermill Paper	457,618	6.9	11,452	44.6
International Paper	1,140,000	0.9	17,300	−55.3
James River (1/26)	608,648	4.5	15,645	5.3
Kimberly-Clark	1,037,200	3.5	73,200	1.2
Longview (1/31)	101,487	−12.8	1,195	−69.2
Louisiana-Pacific	322,560	19.0	1,360	288.6[2]
Mead Corp.	682,800	1.8	18,100	−23.3
Mosinee Paper	48,018	2.1	2,461	33.2
Pentair Inc.	131,145	−3.1	3,643	−40.2
Pope & Talbot	74,087	−10.8	(537)	n.m.
Potlatch Corp.	233,264	−0.6	13,643	18.8
Scott Paper	801,400	15.1	39,100	−7.1
Jefferson Smurfit	242,133	48.7	3,865	0.2
Sonoco Products	226,064	22.4	11,613	7.7
Southwest Forest Industries	142,518	−6.1	(4,262)[2]	n.m.
Stone Container	387,399	26.1	(4,720)	n.m.
Temple-Inland	292,700	−6.6	13,600	−37.3
Union Camp	495,028	6.8	22,039	−26.0
Wausau (2/28)	55,789	13.1	2,540	200.6
Westvaco (1/31)	416,440	−3.0	20,263	−10.9
Weyerhaeuser	1,306,743	2.4	49,984	30.7
Willamette Industries	272,145	−5.5	7,567	−47.0
Total	**$15,405,100**	**−1.6%**	**$480,962**	**−23.3%**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. **Bowater:** 1986 net income is after nonrecurring after-tax charge of $3.4-million for retirement of fixed assets; **Georgia-Pacific:** 1985 income includes $19-million gain from timberland sales; **Great Northern Nekoosa:** includes $3.1-million investment tax credit in 1986 and $2.1-million credit in 1985; **Louisiana-Pacific:** 1985 net excludes $29.4-million gain of cumulative effect of accounting change; **Southwest Forest:** 1986 loss excludes $77,000 loss from discontinued operations and $.7-million loss from induced conversion of convertible debentures; 1985 net excludes $350,000 loss from discontinued operations.

Recent price hikes on key grades such as market pulp, containerboard, and uncoated white papers plus improved operating efficiencies should help International Paper Co.'s earnings as the year progresses, according to IP's chairman and CEO, John A. Georges. But for the first quarter, the company reported a 55% decline in earnings from a year earlier. Georges noted that results were also hurt by startup costs at the company's recently modernized Mobile, Ala., mill.

Champion International Corp. reported a nearly 50% decline in earnings because of lower prices and volume for coated papers and a loss in its packaging segment, according to the company's chairman and CEO, Andrew C. Sigler. (In late February, Champion sold most of its remaining packaging operations—which had an operating loss of $4.7 million for the quarter—to Stone Container Corp.)

Mead Corp. reported a 23% decline in earnings for the first quarter. "Prices and order backlogs made a positive turnaround in the first quarter, although not soon enough to be fully reflected in the quarter's earnings, noted Burnell R. Roberts, chairman and CEO. "The falling U.S. dollar has reopened a number of export markets to U.S. producers, which enabled Mead to increase prices in some areas."

Little better than break-even earnings were reported by Crown Zellerbach Corp. for the first quarter. The main businesses to be operated by James River Corp. following the completion of an exchange offer—paper, packaging, and distribution—reported first-quarter operating earnings of $26.8 million compared with $33.5 million a year earlier. The businesses to be retained by Sir James Goldsmith—timber and wood products, containers, energy, and Eczel—had operating earnings of $1.1 million vs $15 million a year earlier.

Paperboard still weak. Stone Container Corp. posted a $4.7-million loss in first-quarter 1986 earnings, but chairman and CEO Roger W. Stone said prices "continue to strengthen" and reported that first-quarter shipments of corrugated containers, bags, and sacks "were at record highs." Union Camp Corp. chairman and CEO Gene Cartledge noted that the first quarter showed "a meaningful improvement in operating performance compared with fourth-quarter 1985." He said his company expects demand and prices for paper and packaging to improve over the year.

Chesapeake Corp. reported a loss of $2.5 million for the first quarter due to low prices for kraft products from its West Point, Va., mill and difficulties with the new "Tri-Kraft" linerboard machine, which had estimated startup costs of $4 million during the period. Temple-Inland Corp. showed a 37% decline in profits related to depressed prices for containerboard, bleached board, and corrugated containers, as well as startup problems with its new Ontario, Calif., recycled linerboard mill, which had a net loss for the period.

Tissue results steady. Scott Paper Co. reported a 7% decline in net income for the first quarter, mainly due to interest expense connected with the purchase of its shares held by Brascan Ltd. Income from operations was up 16% and reflected record results from the company's domestic sanitary products business, international subsidiaries, and printing and publishing paper business. Despite a "highly competitive marketplace for tissue and cup products," Fort Howard Paper Co. achieved an 11% earnings increase because of higher volume, said its chairman and CEO, Paul J. Schierl.

Kimberly-Clark Corp. reported essentially flat earnings for the first quarter. Chairman and CEO Darwin Smith said that results were hurt by lower diaper volume and newsprint discounting. Conversion of lines to make an improved version of Huggies with an elastic waist reduced diaper output, but the upgrade has now been completed.

Better wood profits. Georgia-Pacific Corp. reported a 38.7% decline in earnings for the first quarter of the year. "Higher housing starts strengthened both demand and price for structural panels and lumber," according to G-P's chairman and CEO, T. Marshall Hahn Jr. "While softwood lumber prices have increased, price levels remain at unsatisfactorily low levels as the volume of Canadian lumber imports continues to increase. And price weakness in pulp and paper caused that segment of the company's business to generate only $2 million in operating profits vs $25 million a year ago," Hahn said. ■

Canadian mills' first-quarter earnings up from 1985

Signs of improved market conditions ahead are reflected in first-quarter sales and earnings reports of 15 leading Canadian pulp and paper firms. Sales for the first quarter of 1986 totaled C$3.859 billion, up 9.4% from first-quarter 1985, and net income of $126.671 million was 43.4% above depressed year-earlier levels. And most companies said that they expect declining interest rates, the weak Canadian dollar, and stronger world economic growth to result in an upward trend in earnings through the remainder of the year.

MacMillan Bloedel Ltd. led off with a ten-fold improvement in net income to $29.2 million (before a $45-million gain on the sale of part interest in a Dutch paper mill) from depressed first-quarter 1985 results. MB attributed its improved results primarily to higher lumber and pulp prices and to the weakness in the Canadian dollar in relation to the U.S. dollar.

The U.S. dollar averaged C$1.40 during the first quarter of 1986 compared with C$1.35 a year earlier and helped lift sales of Crown Forest Industries Ltd., noted the company's president, Ian Donald. The company more than doubled first-quarter earnings to $6.1 million, helped by improving wood products demand and prices plus cost reductions. Donald noted that pulp prices began to firm during the quarter as a result of industry production curtailments, but added that newsprint markets continue to be affected by world overcapacity and slow demand growth.

Great Lakes Forest Products Ltd., the only firm reporting a loss in the first quarter, blamed lower prices for kraft pulp and lower shipment volumes for newsprint. Intense price competition forced curtailment of its mills for varying periods of time during the quarter, noted GLFP's chairman and CEO, Charles J. Carter. However, he noted some recent positive signs included stronger prices for fine paper, lumber, and market pulp.

Canfor Corp. said its improved results (net income of C$2.2 million vs a loss of C$16.6 million a year earlier) came mainly from "efforts to reduce costs and increase productivity and volume, rather than from the recent strengthening of lumber and pulp prices, which did not provide major benefits until after the end of the quarter." Abitibi-Price Inc. said that despite its nearly 25% earnings decline in the first quarter, "full-year results are expected to be somewhat higher than last year." ■

Canadian paper/forest products industry first-quarter results.

Companies	Sales	Change 1986/85	Earnings[1]	Change 1986/85
Abitibi-Price Inc.	C$647,400	11.4%	C$17,800	−24.9%
British Columbia Forest Products	269,500	−2.9	4,800	−40.0
Canfor Corp.	271,700	9.4	2,200	n.m.
Cascades Inc.	82,500	53.0	4,800	100.0
Consolidated-Bathurst	453,800	10.3	14,700	−23.8
Crown Forest Industries	219,000	13.5	6,100	238.9
Domtar Inc.	562,700	6.7	31,300[2]	8.7
Donohue Inc.	117,400	6.0	4,400	−30.2
Fraser Inc.	142,568	0.2	1,100[2]	−38.9
Great Lakes Forest Products	141,706	−4.4	(470)	n.m.
MacMillan Bloedel	613,200	13.9	29,200[2]	1,023.1
Perkins Paper	13,693	19.0	723	40.4
Rolland Inc.	81,300	7.4	2,145	58.3
Scott Paper Ltd.	72,147	5.0	3,368	21.9
Weldwood	170,775	23.6	4,505	n.m.
Total	**C$3,859,389**	**9.4%**	**C$126,671**	**43.4%**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. **Consolidated-Bathurst:** excludes C$47.4-million write down of investment in two oil and gas firms; **Domtar:** excludes tax credits of C$6.2 million in 1986 and C$5.2 million in 1985; **Fraser:** excludes C$3.2 million in tax credits in 1986; **MacMillan Bloedel:** excludes C$45 million gain in 1985 on sale of part of holdings in Dutch paper company KMP.

n.m. — Not meaningful.

MECHANICAL PULPING: Producers looking to chemicals for quality

Of the 16 million metric tons of mechanical pulp produced in North America last year, 25% was treated with either sodium sulfite or sodium sulfite/caustic in a preliminary pulping stage, and nearly all of it was subject to bleaching agents after pulping. Consumption of sodium sulfite, peroxide, and sodium hydrosulfite is expected to increase significantly over the final years of the decade due simply to the market pressures for higher-quality products. These chemicals have helped manufacturers produce pulp that is brighter, stronger, and more versatile.

Pulping. Unfortunately, there has been some trouble with nomenclature of mechanical pulping processes that involve pretreatment chemicals. Countries, supplier companies, and paper companies have all contributed to the problem. The committees of the various technical associations (CPPA, TAPPI, EUCEPA) are working out a universal acronym glossary, but it may be some time before widely accepted standards are found. In the meantime, CPPA's Technical Section has provided the first glossary, with typical chemical inputs (percent Na_2SO_3/NaOH, based on wood) as follows: CMP (2% to 3%), CTMP (2% to 4%), CRMP (2% to 7%), TMCP (7% to 12%), SCMP (2% to 7%), and BCMP (5% to 7%).

Increased production of the processes so designated is a reflection of producers wanting higher yields in pulping, as well as end users wanting high-quality/low-cost materials. Sulfite mills, troubled by new environmental restrictions, will move to increase chemical consumption in mechanical operations, enhancing their yield and eliminating costly recovery and treatment of sulfite cooking liquor.

There are many proven reasons for chemical pretreatment of mechnical pulp. Compared with TMP, chemically treated TMP exhibits superior tensile, bulk, unbleached brightness, and opacity. However, the amount of chemicals added depends on the end use of the pulp. In a larger mill, particularly if it is using a CTMP process and the pulp is part of a newsprint furnish, consumption will be held to a minimum. Smaller mills, especially those converting to ultrahigh-yield sulfite methods and making pulp for specialty groundwood grades, will tend to favor increased amounts of chemical addition.

Other factors that affect pulp properties are the point of addition and temperature and pressure applied to chips in relation to the point of addition. It should also be taken into consideration that chemical pretreatment will be needed to maintain pulp quality as the quality of wood resources declines.

Bleaching. Much attention has centered on achieving a higher-brightness mechanical pulp. The driving force of this attention is end user market conditions. Standard newsprint prices remain depressed, yet grades suitable for offset and rotogravure printing have been fairly stable. Chemical suppliers of sodium hydrosulfite, peroxide, and Borol (a sodium hydrosulfite-based product from Ventron) have stepped up their shipments to the high-quality producers. Most suppliers see a rosy picture for the remainder of the decade if TMP growth continues and sulfite output declines.

The most bullish viewpoint has been taken by hydrogen peroxide producers, some backing up their forecasts with production expansion. In the U.S., FMC and Interox increased their output at existing facilities by 25,000 tpy. Degussa Corp., the German chemical firm's U.S. subsidiary, is constructing a 36,000-tpy plant in Mobile, Ala. Canadian supply should be aided by the construction of a DuPont plant in Maitland, Ont. (40,000 tpy), and the postponed FMC plant in Squamish, B.C. (11,000 tpy). Hydrogen peroxide has proved its ability to bleach mechanical pulp to high brightness, maintaining high yields without an increase in the effluent load. Typical additions are in the 2% to 4% range based on wood.

Two developments are also receiving a lot of attention. The announced construction of an onsite hydrogen peroxide generator at Abitibi-Price Inc.'s Provincial Papers in Thunder Bay, Ont., will interest mechanical pulp mills seeking peroxide-based systems. Two systems have been developed already. Degussa Corp. is planning to introduce its single-stage process at a European site in 1986 and the Canadian research institute, PAPRICAN, is developing the PRP sequence (peroxide-reduction-peroxide) for initial commercial applications at Consolidated-Bathurst Inc.

The largest share of the mechanical pulp bleaching market is still held by the producers of sodium hydrosulfite-based products. The principal suppliers, Ventron and Virginia Chemicals, have commented that their products are being modified on a site-specific basis. The reason seems to be tied to the varying wood resources available to customers (mills). Both suppliers expect repetition of the steady growth experienced in 1985 but without the benefit of a price hike. No supply increase has been mentioned by either company, but the availability of product should remain loose throughout the year.

TABLE 1: **Chemical consumption of mechanical pulping systems in North America (short tons).**

	Mechanical pulping	All pulp & paper	All industry	Price[2]
Sodium hydrosulfite[1]	51,000	51,000	150,000	0.64
Hydrogen peroxide[3]	22,000	33,000	150,000	0.61
Sodium sulfite[4]	37,000	—	—	0.23

1. Includes hydrosulfite produced from sodium borohydride solutions.
2. End of first quarter, dollars per pound.
3. Courtesy of E.I. DuPont Corp.
4. Includes sodium bisulfite produced from caustic and sulfur dioxide.

MECHANICAL PULPS SERVE A VARIETY OF END USES AS CAPACITY OF LINES GROWS

PPI survey shows investment in modern mechanical pulps is increasing—about 260 installations are in operation or planned

P&P Staff Report

The world's capacity of modern mechanical pulps will increase by 6.5 million tons during the 1986-88 period, reaching a total installed capacity of 22.5 million tons. That is the main finding of the 1986 Modern Mechanical Pulps Survey carried out by *Pulp & Paper International*'s Data Products Dept., which lists 48 projects scheduled to start up in the next three years.

It is clear from the survey results that 1986 is a key year for modern mechanical pulps. New capacity for the year will total 13% of installed tonnage—the largest rise in capacity recorded in the history of *PPI*'s survey, which started in 1968. Meanwhile, some of the largest lines yet built are coming onstream this year or are in their initial construction phases.

The survey also confirms the trend noted last year toward continued diversification of end uses for all types of mechanical pulps. Two new market chemi-thermomechanical pulp (CTMP) lines have started up in Europe since the last survey. In early 1987, KNP's Lanaken mill in Belgium will start up a CTMP line supplying pulp for a lightweight coated (LWC) paper machine.

Thermomechanical pulp (TMP) continues to be the dominant grade. While it is a standard grade for newsprint, it is also finding use in directory paper and LWC grades. Pressurized groundwood (PGW) pulping is gaining a good reputation with printing paper manufacturers, especially in the supercalendered (SC) paper market. The latest orders for the Tampella system are coming from the U.S. and Japan.

A new category has been added to this year's survey: thermogroundwood (TG) pulping. Developed by Voith, Fed. Rep. Germany, this process is essentially conventional stone groundwood pulping but with accurate temperature control of the grinding zone. So far, 11 stone groundwood grinders have been rebuilt for the new process, and a further 14 modifications to existing installations are expected to be in service by early 1987. Voith is unwilling to disclose the names of the purchasing companies, but most of them are believed to be in Europe.

AVERAGE LINE CAPACITY IS GROWING. Analyzing the end uses for all mechanical pulps, *PPI* finds that by the end of 1986, almost 14 million tpy will be consumed by newsprint producers—most of it TMP. The second biggest consumers are other printing and writing grades, with about 3 million tpy, again with the major share being TMP. From 1985 to 1986 inclusive, about 500,000 tons will have been added to the world's capacity for these grades. The equivalent figure for newsprint is about 2 million tpy. Market pulp now accounts for about 2 million tpy of production, and of this 800,000 tpy are CTMP.

All measurements contained in this article are metric.

TABLE 1: **Modern mechanical pulps, 1968-88: number of installations by continent and end product.**

Grade	Europe	North America	Other	Total
Board	16	2	0	18
Molded products	2	2	0	4
Market pulp	17	6	3	26
Newsprint	52	62	31	145
Other	1	2	2	5
Printing/writing	26	20	3	49
Pilot plant	2	2	2	6
Tissue	1	1	2	4
Total	117	97	43	257

TABLE 2: **Modern mechanical pulps, 1968-88: capacity by continent and end product (000 metric tpy).**

Grade	Europe	North America	Other	Total
Board	823	172	0	995
Molded products	18	35	0	53
Market pulp	826	645	455	1,926
Newsprint	4,919	7,545	2,591	15,055
Other	32	309	11	352
Printing/writing	1,957	1,805	157	3,919
Pilot plant	10	7	23	40
Tissue	65	85	52	202
Total	8,650	10,603	3,289	22,542

Subjecting the survey results to computer analysis showed that the average size of the modern mechanical pulp line has grown considerably since the mid-1970s. Although the results are somewhat distorted by some extremely large installations (i.e., TMP lines at major newsprint mills), there is a clear trend toward higher-capacity units. Whereas the average pulp line size was approximately 50,000 tpy in 1976, tdoay it is approximately 115,000 tpy, and by 1987 it can be expected to reach some 135,000 tpy.

Clearly, the reservations that pulp and paper producers may have had about the new mechanical pulps are rapidly being overcome, as are their reservations (and their bankers' reservations) about finance. Modern mechanical pulp lines can be built relatively quickly (about 18 months for a CTMP line) so that construction can be timed more easily to match market conditions than is possible with chemical pulp lines.

MECHANICAL PULP GRADES IN 1986. Looking at the modern mechanical pulps grade by grade, starting with CTMP, many observers expect that greenfield market pulp capacity in the short term is likely to be in the form of relatively small (and relatively cheap) CTMP lines. The expanding fluff pulp market will be the target.

Further indications toward how such investment will proceed have been given by the startup of the two European mills, which are producing some of their output for the market. MoDo-Iggesund completed its joint venture investment in a 65,000-tpy CTMP line at Domsjö, Sweden, last December. Serlachius, Finland, started up its 70,000-tpy line—the first CTMP line in Finland—in April of this year.

Both lines are located on the sites of former sulfite pulp mills, with ready-made infrastructures and easily available chemicals. Both are subsidiaries of major producers with interests in both tissue and board—grades

TABLE 3: **Selected mechanical pulp projects, 1985-88 (000 metric tpy).**

Country	Location	Startup date	Capacity (1,000 tpy)	Type of pulp	Raw material	Grades produced	Supplier
Australia							
Australian Newsprint Mills	Boyer, Tasmania	1987	72	TMP		Newsprint	Sunds Defibrator
Bangladesh							
Khulna Newsprint Mills	Khalishpur, Khulna	1985	48	CMP	Gewa wood	Newsprint, magazine	
Belgium							
Papeteries de Belgique	Langerbrugge	1986	88	TMP	Spruce, pine	Newsprint	Jylhävaara
KNP	Lanaken	1987	70	CTMP		LWC	Sunds Defibrator
Brazil							
Papel Imprensa	Jaguariaiva Parana	1985	70	TMP	Pinus taeda & elliotti	Newsprint	Bauer
Canada							
Abitibi-Price	Gaspesia, Que.	1986	85	CMP	Spruce	Newsprint	Bauer
Consolidated-Bathurst	Shawinigan, Que.	1987	210	CTMP	Spruce, balsam	Newsprint	Sprout-Waldron
Corner Brook	Corner Brook, Nfld.	1986	120	TMP	Spruce	Newsprint	Bauer
Doman Industries	Nanaimo, B.C.	1988	175	TMP		Market pulp, news	
Domtar	Dolbeau	1987	210	CTMP		Newsprint	Sunds Defibrator
Donohue	Clermont, Que.	1985	300	TMP	Black spruce/ balsam/fir	Newsprint	Sunds Defibrator
Kruger	Bromptonville, Que.	1986	189	PRMP	Spruce, balsam	Newsprint	Bauer
Kruger	Bromptonville, Que.	1988	72	TMP	Spruce	Newsprint	Bauer
MacMillan Bloedel	Powell River, B.C.	1985	245	CTMP			
Makin Project Initiators	Brittania Beach, B.C.	1986	135	CTMP	Spruce, aspen	Market pulp	Sprout-Waldron
Ontario Paper	Thorold, Ont.	1986	20	TMP	Pine, spruce	Newsprint	Hymac
Tembec Forest Products	Temiscaming, Que.	1986	100	CTMP	Softwood, hardwood	Market pulp	Sunds Defibrator
China, People's Rep.							
Jilin Paper Mill	Jilin	1987	45	CTMP		Newsprint	Sunds Defibrator
Costa Rica							
Scott Paper de Costa Rica	San Jose	1987	7	CTMP			Sprout-Waldron
Finland							
Kajaani	Kajaani	1986	168	TMP		Newsprint	Sunds Defibrator
Serlachius	Lielahti	1986	70	CTMP	Spruce	Market pulp	Sunds Defibrator
United Paper Mills	Kaipola	1987	175	TMP	Spruce	LWC	Jylhävaara
France							
Nouvelle Chapelle Darblay	Grande Couronne	1986	140	TMP	Spruce, pine	Newsprint, directory	Sprout-Waldron
Nouvelle Chapelle Darblay	Grande Couronne	1987	75	TMP	Pine, spruce	Newsprint	Sprout-Waldron
Nouvelle Chapelle Darblay	St. Etienne-du-Rouvray	1986	100	TMP	Spruce	LWC	Sprout-Waldron
Germany, Fed. Rep.							
Albbruck	Albbruck	1986	35	PGW		Woodcontaining pr/wr	Tampella
Haindl	Schongau	1987	100	TMP	Spruce	Newsprint	Sprout-Waldron
Haindl	Walsum	1985	100	TMP	Spruce	LWC	Sunds Defibrator
Haindl	Walsum	1986	42	TMP		LWC	Sunds Defibrator

that are almost universally considered prime potential consumers of CTMP—so they can guarantee that a large proportion of production will be captured by the parent firms.

The two companies are aiming to sell the balance of the production to sanitary paper and diaper manufacturers. To this end, they are offering pulp in both sheeted bales and reels. This is considered highly important to winning market share since most users of fluff pulp work with reels.

CTMP market pulp is also under consideration in the Congo. Rather than building a chemical pulp mill to use its extensive eucalyptus forests, the Congolese government is considering a CTMP line. If it goes ahead, the project will be one of the first commercial CTMP processes to use eucalyptus wood. Target markets would not only include tissue producers and board makers but would also include printing/writing paper mills. The Congolese government is arranging for a market study to be carried out on the acceptability of the new pulp. Eucalyptus logs will be shipped to Rottneros Bruk AB's CTMP mill in Sweden, and a sample of about 200 tons will be produced for trials during the summer at European mills.

A second interesting aspect of CTMP is its increased use in printing/writing paper. Manufacturers of these grades are becoming more interested in bleached CTMP as an element in their furnishes. Part of the problem in implementing its use is the need to satisfy government authorities that the effluent from bleached CTMP lines is within acceptable limits.

Some of the pioneering work in introducing CTMP to LWC paper is being carried out in Belgium by KNP's Lanaken mill. Latest reports indicate that the mill will start up ahead of schedule in December 1986, making 175,000 tpy of LWC and using 55,000 tpy of CTMP furnish.

The large majority of the pulp produced by the 239 lines operating around the world is TMP for newsprint

Country	Location	Startup date	Capacity (1,000 tpy)	Type of pulp	Raw material	Grades produced	Supplier
Japan							
Chuetsu Pulp		1986	80	CTMP		Newsprint	Sunds Defibrator
Oji Paper	Tomakomai	1986	45	PGW	Red pine	Woodcontaining pr/wr	Tampella
Mexico							
Durango, Grupo Industrial	Durango	1986	85	CTMP	Pine	Market pulp	Sprout-Waldron
Netherlands							
Parenco	Renkum	1987	160	TMP	Pine, spruce	Newsprint	Sprout-Waldron
New Zealand							
Forest Research Institute	Rotorua	1986	20	CTMP		Pilot plant	Jylhävaara
New Zealand Forest Products	Marsden Point	1986	60	TMP	Pine	Coated pr/wr	
Nigeria							
Nigerian Newsprint	Oku Iboku	1985	100	CMP	Gmelina	Newsprint	
Norway							
Follum Fabrikker	Hönefoss	1987	200	TMP	Spruce	Newsprint	Sprout-Waldron
Sweden							
Billerud	Grüvon	1985	0	TMP	Softwood	Board	
Holmens Bruk	Braviken	1985	38	TMP		Newsprint	Sunds Defibrator
Holmens Bruk	Braviken	1986	42	TMP		Newsprint	Sunds Defibrator
Holmens Bruk	Hallstavik	1985	35	TMP		Newsprint	Sunds Defibrator
MoDo-Iggesund	Domsjö	1986	65	CTMP		Board, tissue	Sunds Defibrator
Rockhammars Bruk	Frövi	1985	40	CTMP	Softwood	Market pulp	
SCA	Ortviken	1985	250[1]	TMP	Spruce	Newsprint	Sunds Defibrator
Stora	Kvarnsveden	1986	63	TMP		Newsprint	Sunds Defibrator
Taiwan							
Chung Hwa	Hualien	1985	85	CTMP		Newsprint	
United Kingdom							
Shotton Paper	Shotton	1985	250	TMP	Spruce	Newsprint	Jylhävaara
Thames Board	Workington	1985	31	TMP	Spruce, pine	Paperboard	Sunds Defibrator
U.S.							
Bowater	Calhoun, Tenn.	1986	350	TMP	Southern pine	Newsprint	Bauer
Bowater Carolina	Catawba, S.C.	1986	137	TMP	Southern pine	Coated grades	Bauer
Catawba Newsprint Co.	Catawba, S.C.	1986	221	TMP	Southern pine	Newsprint	Bauer
Consolidated Papers	Biron, Wis.	1986	73	TMP	Spruce	LWC	Sprout-Waldron
Inland Empire	Spokane, Wash.	1986	365	CTMP	Douglas fir	Newsprint	Sprout-Waldron
Lake Superior Paper Ind.	Duluth, Minn.	1987	140	PGW	Spruce, balsam fir	SC papers	Tampella
U.S.S.R.							
Balachus	Balachus	1988	200	CTMP	Aspen, spruce	Newsprint	Sunds Defibrator
Syktyvkar	Syktyvkar	1987	165	CTMP	Spruce, aspen	Pr/wr, magazine	Sunds Defibrator
Undisclosed							
Newsprint/LWC/SC		1985-87	269	TG	Spruce/pine/fir		Voith
Tissue		1986	85	CTMP	Pine		Jylhävaara

1. Capacity of latest investment.

TMP = thermomechanical pulp; CTMP = chemi-thermomechanical pulp; CMP = chemimechanical pulp; PGW = pressurized groundwood pulp; TG = thermogroundwood pulp; PRMP = pressurized refiner mechanical pulp.

production. Svenska Cellulosa AB's Ortviken line is now ranked as the world's biggest integrated TMP line, with a daily output of 2,000 tpd from a line of Sunds Defibrator refiners. The company is among the few producers in the world to make some of its newsprint with 100% ~~TMP~~ furnish.

One of the biggest TMP investments planned for the next three years is ~~the~~ line to be built in Finland by Jylhävaara for United Paper Mills' Kaipola mill, where a 9.1-m 170,000-tpy LWC machine will come onstream in 1987.

Pressurized groundwood pulp has made an international impact this year, with developments in Japan, the U.S., and Europe. Lake Superior Paper Industries' system will start up in 1987, making 140,000 tpy of PGW, the largest line in the world.

TG pulps made their debut in 1985. Voith describes their quality as being between stone groundwood pulp and PGW. Consequently, they are suitable for use in a wide range of papers, but they compete essentially with PGW.

TECHNICAL DEVELOPMENTS. On the technical side, significant developments in refiner and grinder technology and heat recovery systems for modern mechanical pulping methods continue. Supporting *PPI*'s finding that lines are becoming bigger, Sunds Defibrator has also launched a new conical-disc refiner, the RGP-76-CD, which has a single-stage capacity of 180 tpd. The first installation will be at Stora Kopparberg Group's Kvarnsveden newsprint and SC paper mill in Sweden. Power requirement is up to 18 MW at 50 Hz.

Another example is a large two-stage refiner, the HXD 64, launched by Hymac and capable of up to 30,000 installed hp. The refiner has two independent refining zones with intermediate steam extraction. A thrust bearing is provided to absorb the differential thrust between the refining zones. This permits operation of one zone by itself. The first such refiner will start up in 1987, according to the company. Sprout-Waldron has also introduced a large refiner—the Twin 60—with an installed power of 22,000 hp.

Research into all aspects of the CTMP process has led to the development of a two-stage impregnation process at the Rottneros mill in Sweden. This system, which will also be installed at Makin Pulp & Paper Ltd., Alberta, Canada, enables two different chemicals to be used to impregnate the chips in two successive stages. The second stage operates under pressure.

Considerable work is also being put into the treatment of rejects. Sunds Defibrator has worked with Bowater Svenska AB's mill in Umeå, Sweden, to produce a new system for handling rejects from stone groundwood pulp lines. Called the CTMP_R process, rejects from the screen room are pumped to a dewatering press, where consistency is increased to 35%. They are then moved by screw conveyor to a Rotomixer for mixing with 2% to 3% sodium sulfite. After a retention time of 5 to 10 min in a reactor vessel, the rejects are sent to a pressurized refiner. The heat generated in refining is recovered and used for the chemical treatment stage. Bowater and Sunds Defibrator say that the pulp produced is low in shives and is salable as market pulp.

MacMillan Bloedel Ltd.'s Powell River, B.C., mill has taken delivery of equipment for chemical treatment of long fiber (CTLF) from Hymac. With a design capacity of 360 b.d. tpd, the system will start up this month. Screened rejects from a CTMP line are thickened in a screw press to 30% consistency then fed through a pulp plug screw feeder into a high-consistency steam and chemical mixer. The pulp is retained under pressure in a vertical digester in the presence of sodium sulfite for about 20 min before being discharged to a transfer chest. It is then washed in a second set of presses before being fed to the reject refiners.

For PGW, Tampella says that using a Hedemora pressure disc thickener in the grinding system increases pulp strength by 15% and improves heat recovery. ■

TABLE 4: **New mechanical pulp installations by type, 1984-88, (000 metric tpy).**

Year	TMP	CTMP	PGW	CMP	PRMP	TG	Total
1984 capacity	831	445	77	—	—	11	1,364
Number of installations	7	6	2	—	—	1	16
1985 capacity	1,324	435	—	148	—	111	2,018
Number of installations	9	4	—	2	—	3	18
1986 capacity	1,624	860	80	85	169	89	2,827
Number of installations	15	8	2	1	1	3	30
1987 capacity	782	662	140	78	—	82	1,744
Number of installations	6	5	1	1	—	1	14
1988 capacity	247	200	—	100	—	—	547
Number of installations	2	1	—	1	—	—	4
Total capacity	**4,808**	**2,602**	**297**	**411**	**169**	**293**	**8,580**
Number of installations	**39**	**24**	**5**	**5**	**1**	**8**	**82**

TMP = thermomechanical pulp; CTMP = chemi-thermomechanical pulp; PGW = pressurized groundwood pulp; CMP = chemimechanical pulp; PRMP = pressurized refiner mechanical pulp; TG = thermogroundwood pulp.

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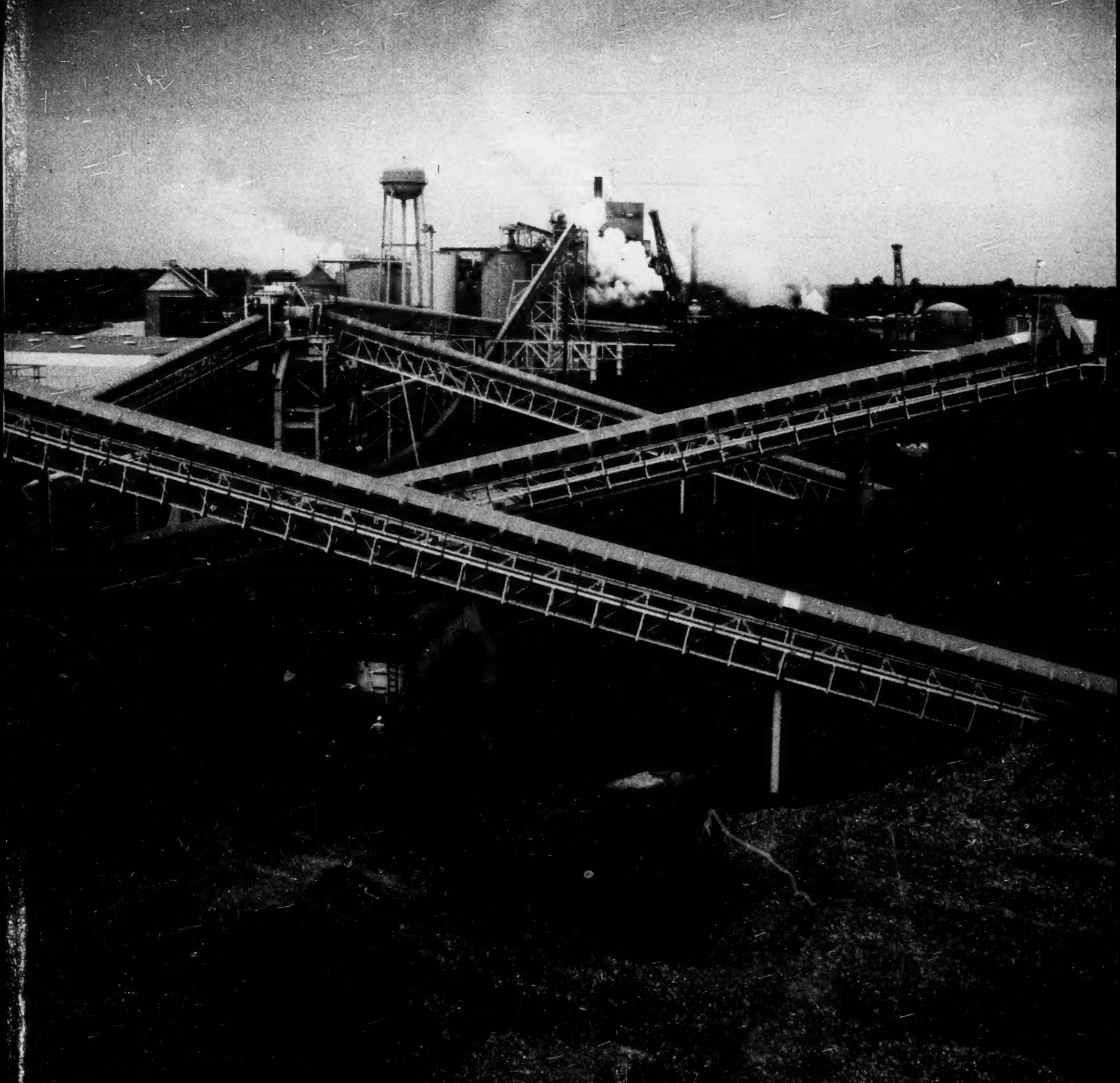
PULP & PAPER

July 1986



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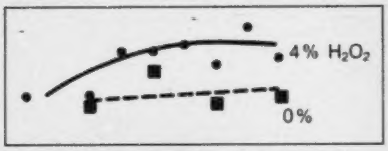

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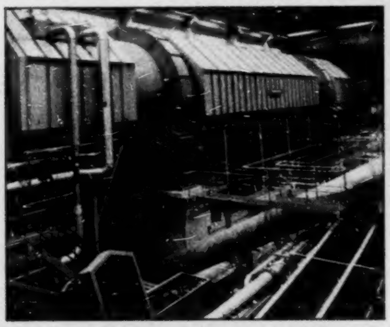

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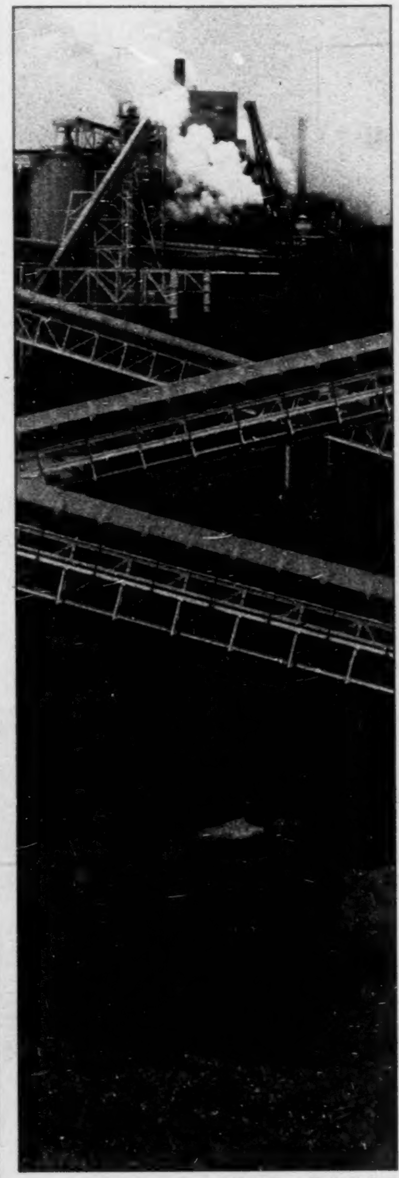

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Wood preparation area at Stone Container Corp.'s kraft linerboard mill in Florence, S.C. (Photo courtesy of Stone Container Corp.)

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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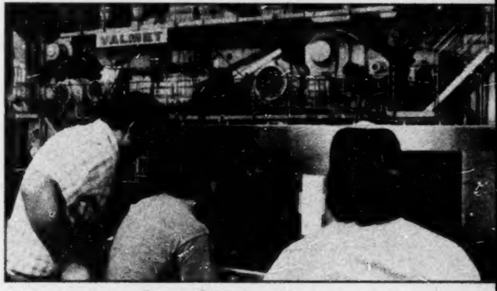

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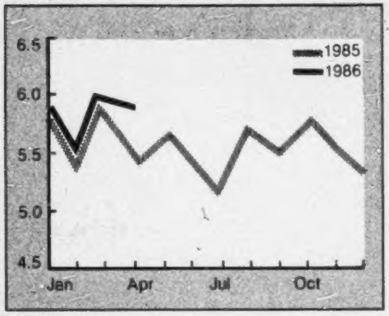
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 5.8 million tons in April, up 7.2% compared to the year before, according to the American Paper Institute. Fueled by continued strong demand, the production rate topped the record 1984 level for the fourth straight month in April.

Among major grades, unbleached packaging continued to lose ground in the face of competition from plastics and sluggish markets for shipping sacks, while coated paper also remained weak. Uncoated free-sheet rose a strong 7.6% compared to last year, however, and the paperboard grades all showed solid gains between 4% and 6%. Reflecting the decline in the dollar, containerboard production for export jumped 27.6%. Containerboard inventories were 17% below year-earlier levels, the Fibre Box Assn. said, while corrugated box shipments rose to 25.174 billion ft^2, a new record for the month.

Canadian newsprint shipments rose to 800,000 metric tons in April, a gain of 5.8% over April 1985. Operating rates rose to 92%. Canadian pulp shipments jumped a strong 14.6%, to 650,000 tons, while operating rates stood at 90%, compared to 79% last year. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Apr.	451	5.6	5,511	0.3
Uncoated groundwood (s)	Apr.	120	−2.4	1,461	−3.4
Coated paper (s)	Apr.	473	−8.3	5,957	−6.3
Uncoated free sheet (s)	Apr.	839	0.8	10,367	7.6
Other printing/writing	Apr.	120	6.2	1,445	18.1
Total packaging and other paper (s)	Apr.	443	9.1	5,188	−1.0
Tissue	Apr.	433	9.9	5,048	3.2
Total paper	**Apr.**	**2,880**	**2.5**	**34,977**	**1.5**
Unbleached kraft paperboard	Apr.	1,446	12.6	17,104	4.1
Semichemical medium	Apr.	443	7.8	5,222	5.0
Bleached paperboard	Apr.	361	5.9	4,292	6.4
Recycled paperboard	Apr.	681	19.1	8,022	5.4
Total paperboard	**Apr.**	**2,932**	**12.4**	**34,640**	**4.8**
Total U.S. paper and paperboard output	**Apr.**	**5,812**	**7.2**	**69,617**	**3.2**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Mar.	4,856	0.2	56,434	2.2
Market pulp production	Mar.	636	4.3	7,388	3.9
Wastepaper consumption at paper/board mills	Mar.	1,415	4.0	16,402	5.1
Pulpwood consumption (cords)	Mar.	7,478	−2.3	90,476	2.6
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Apr.	25.174	11.2	93.122[6]	6.0
Containerboard inventories at U.S. box plants and mills	Apr. 1	2,517	−16.7		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Mar.	945	−9.7	11,378	1.3
Imports of Canadian newsprint	Mar.	698	−8.0	8,251[6]	1.2
U.S. paper exports (including products)	Mar.	416	17.2	4,506	14.6
Exports of unbleached kraft linerboard	Mar.	195	27.5	2,024	20.2
Exports of woodpulp	Mar.	414	3.8	4,493	21.8
Norscan pulp inventories[4]	Apr. 30	1,025	−35.5		
Norscan pulp operating rates[4]	Apr.	86%	90%	94%	89%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Apr.	800	5.8	2,956[6]	−1.8
Operating rates	Apr.	92%	91%	92%	95%
Inventories held by U.S. consumers	Apr. 30	1,411	−7.6		
Other paper/board shipments	Apr.	531	17.7	1,983	11.1
Woodpulp shipments (export only)	Apr.	650	14.6	2,550[6]	18.4
Operating rates	Apr.	90%	79%	91%	88%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

CORRUGATING MEDIUM: Low capacity growth should help operating rates in 1986

Grade structure: Corrugating medium, the middle fluting material used in corrugated containers, is made from both semichemical pulp and recycled fiber. In 1985, 78% of corrugating medium was made from semichemical furnish (which normally contains at least 20% recycled fiber) and 22% was "bogus" medium made from wastepaper. Basis weights of corrugating medium are 22, 26, 33, 36, and 40 lb/1,000 ft². Standard sheet weight is 26 lb, which accounts for more than 80% of production. Recycled medium for equivalent uses is normally produced in slightly higher weights.

Production/capacity: Production of corrugating medium declined by 0.8% in 1985 from the previous year to 6.5 million tons. Production was hurt by a 0.4% decline in corrugated box shipments plus extensive mill downtime to reduce excess inventories built up during 1984.

Semichemical medium production declined 1.6%, but recycled medium output increased 2.2%—perhaps reflecting a competitive advantage held by recycled mills due to low wastepaper costs. This resulted in about a 94% operating rate for semichemical mills and a 91% rate for recycled mills.

Outlook: The outlook for corrugating medium this year and beyond is brighter. Through April, corrugating medium production was running about 6% ahead of a year ago. For all of 1986, however, corrugating medium output is projected to rise 4.1%.

Corrugated box shipments for the first four months were up 6% but are projected to increase 3.5% for the year. Some of the recent strength in both medium and corrugated box shipments is believed to reflect inventory building at the converting plant and end user level in anticipation of recent price increases. U.S. industrial production so far is up only 1% to 2%, and economists (as measured by *Blue Chip Economic Indicators*) are looking for a 3.3% increase for all of 1986.

No new semichemical medium machines have been announced in the U.S., and capacity is expected to rise only 1.4% this year and 2.2% in 1987. Since the American Paper Institute capacity survey was released, Harriman Paperboard Corp.'s 250-tpd mill in Harriman, Tenn., has been shut down. It may be reopened under new ownership. In addition, Willamette Industries Inc. has announced plans to shut down a 256-tpd machine at its Albany, Ore., mill in the summer of 1987.

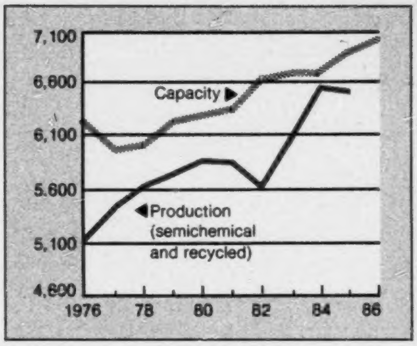
Recycled corrugating medium capacity, however, is growing at a faster rate and will jump 1% this year and 8.1% in 1987. The big increase in 1987 reflects the startup late this year of a 425-tpd jump machine being converted from linerboard by Chesapeake Corp. at its West Point, Va., mill.

Prices: Corrugating medium prices began to erode in the second half of 1984 when an attempt to lift the price of 26-lb semichemical from $310 to $340 did not take hold. By the second half of 1985, prices had declined to about $240/ton and lower in the eastern U.S. independent box market. This year, transaction prices have begun to recover and by late spring reached about $260/ton (vs a list of $270 to $280). A further $30/ton price increase was announced for June 1, although it may not become fully effective until the end of the summer.

Medium prices have shown less pickup in the latest market recovery than have linerboard prices, and medium has been selling at more than its normal $10/ton differential to liner (at least in terms of transaction prices). Among possible explanations: Only a small amount of medium is exported and demand has not been helped by the upturn in overseas markets; most medium machines have been running well (in contrast to production problems at some liner mills); low wastepaper prices have increased the cost competitiveness of recycled mills; and exchange rates have done the same for the Canadian corrugating medium mills that ship into the U.S.

Price history at year-end for 26-lb semichemical medium in eastern U.S. is as follows: 1980, $260; 1981, $290/260; 1982, $240; 1983, $280; 1984, $310; 1985, $240; 1986 May, $260. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

	1984	1985	1986e
Production[1]			
Semichemical	5,169	5,084	5,285
Recycled	1,385	1,416	1,480
Total	**6,554**	**6,500**	**6,765**
Capacity[1]			
Semichemical	5,252	5,415	5,493
Recycled	1,524	1,555	1,570
Utilization rates (%)			
Semichemical	98.4	93.9	96.2
Recycled	90.9	91.1	94.3
Imports[2]	104	65	90
Exports[1]	149	184	200
Apparent U.S. consumption			
000 tons	6,509	6,381	6,655
lb/capita	55.0	53.5	55.3
GNP ratio	1.86	1.79	1.81

1. American Paper Institute data.
2. Dept. of Commerce data.

TOP PRODUCERS *(000 tpy)*

	Annual capacity			**Market**
	Semi-chem	**Recycled medium**	**Total**	**share (%)**
1. Stone	652	168	820	11.6
2. O-I	628	—	628	8.9
3. Weyco	620	—	620	8.8
4. Inland	190	250	440	6.2
5. Willamette	240	120	360	5.1
6. Mead	335	—	335	4.7
7. IP	330	—	330	4.6
8. CCA	115	165	280	4.0
9. Va. Fibre	260	—	260	3.7
10. PCA	260	—	260	3.7

Market share of top five companies: **40.6%**
Market share of top ten companies: **61.3%**
Total U.S. capacity (1986):
7.083 million short tons

1. Reflects 31% interest in 100,000-tpy Groveton Paper Board.
2. Includes 50% interest in 130,000-tpy machine at Sonoco Products' Harstville, S.C., mill.
3. Excludes 78,000 tpy of capacity at Sturgeon, Ont.

CAPITAL SPENDING

U.S. companies stick to spending increases

With business conditions generally expected to improve this year, U.S. pulp and paper companies are sticking with plans to boost capital spending in 1986 for the fourth year in a row, according to two recent surveys.

The paper industry will spend $8.85 billion on new plant and equipment this year, up 3.8% from 1985, according to the Commerce Dept.'s Bureau of Economic Analysis. While still up from last year, the latest figures signal a slowing in the rate of capital spending growth. A 3.8% increase this year would be the smallest since the recession ended in 1983. Industry outlays rose 21.8% in 1984 and 18.3% last year. Total spending for 1985 was $8.53 billion, according to the BEA's final revision.

The 3.8% increase shown in the latest BEA survey compares favorably with last fall's survey, which forecast an increase of 3.6% for 1986. In fact, the increase is larger than the percentage difference shows because the BEA has revised its capital goods deflator (a measure of inflation) drastically downward following a comprehensive revision of national income and product accounts in December. Last fall, capital goods inflation was expected to be 2.7% in 1986. The current survey cuts that figure in half, to 1.3%. The final revision for 1985 lowered the deflator from 3.4% to only 1.4% for all of last year.

Larger increase? In contrast to the BEA study, McGraw-Hill Economic's recent spring survey of capital spending plans shows paper industry capital expenditures rising 7.8% in 1986, to $9.20 billion. McGraw-Hill's latest report seems to reflect an optimism not seen in the BEA study—the two surveys had reached similar conclusions last fall. At that time, McGraw-Hill forecast that spending would increase to $8.58 billion in 1986.

McGraw-Hill's estimate for next year's spending has grown consistently more pessimistic since last year. In its 1985 spring survey, McGraw-Hill forecast that 1987 spending would drop only 2.6%. In the fall, that downturn rose to 9.8%. Now paper industry spending is expected to drop 11.4% in 1987 to $8.15 billion. Preliminary plans for 1988 show capital outlays dropping 9.8%, to $7.35 billion, according to the McGraw-Hill report.

Company plans. A survey of 29 major U.S. companies shows a mixed bag of spending plans and strategies for 1986. Overall, the companies in the accompanying table plan to lower 1986 capital spending 3.7% compared with last year, and some chief executives said that changes in the tax code might lower their spending further. Several companies will reduce spending after completing major projects this year, but this is offset somewhat by others that are beginning major new spending programs.

Chesapeake Corp. will cut spending 52% this year after installing a new linerboard machine at its West Point, Va., mill last year. Now in the final year of an eight-year capital spending program, International Paper Co.'s outlays will decrease 25% this year. IP completed its Mobile, Ala., white paper conversion in 1985, but the company still has a major modernization under way at Pine Bluff, Ark.

Scott Paper Co. will complete a five-year spending program this year and expects spending to drop 22% compared with 1985. Scott completed a major energy project in Mobile, Ala., last year and will complete a new machine installation at Skowhegan, Maine, and a power system modernization at Chester, Pa., this year. Georgia-Pacific Corp. finished major grade conversion projects at Crossett, Ark., and Monticello, Miss., last year and will reduce spending about 24% in 1986. G-P still has a new machine installation under way at Zachary, La., for completion this year. Also installing new paper machines this year are Bowater Inc., Consolidated Papers Inc., and Hammermill Paper Co.

James River Corp. and Fort Howard Paper Co. are leading the group of companies that plans to raise spending. James River has expanded its

Capital spending plans at major U.S. paper/forest products companies for 1986.

Company	1986	1985	Percent change
Boise Cascade	300	350	−14.3%
Bowater	220	358	−38.5
Champion International	450	403	11.7
Chesapeake	44	91	−51.6
Consolidated Papers	157	138	13.8
Federal Paper Board	60	47	27.7
Fort Howard Paper	350	198	76.8
Georgia-Pacific[1]	330	435	−24.1
Great Northern Nekoosa	160	113	41.6
Hammermill Paper	245	195	25.6
International Paper[2]	385	516	−25.4
James River	280[3]	218	28.4
Kimberly-Clark	350	426	−17.4
Longview[4]	22	35	−37.1
Louisiana-Pacific	150	153	−2.0
Manville Forest Products	25	20	25.0
Mead	200-225	239[6]	−5.9
Packaging Corp. of America	26.8	22	21.8
Pentair	50	62	−19.4
Pope & Talbot	10.7[5]	23	−53.5
Potlatch	109	63	73.0
Scott Paper	400[7]	514	−22.2
Sonoco Products	50	38	31.6
Stone Container	60	47	27.7
Union Camp	240	240	—
U.S. Gypsum (USG Corp.)	150	165	−9.1
Wausau Paper	10.5	7	50.0
Weyerhaeuser	450	396	13.6
Willamette Industries[8]	35	37	−5.4

1. Pulp and paper sector only. 2. Pulp, paper, and packaging only. 3. Estimate based on $1.4 billion total 1986-90 spending plan. 4. Plant and equipment only. 5. Excludes $60 million for timber purchase. 6. Capital commitment at end of 1985. 7. Estimate based on $800 million planned spending for 1986-87. 8. Manufacturing improvements only.

capital spending plans to $1.4 billion for the 1986-90 period. Fort Howard plans to spend $950 million through 1988 on its new recycled tissue mill at Rincon, Ga., and other projects.

After a year or so of digesting major expansion projects or acquisitions, several other companies also plan to boost capital expenditures in 1986. After a successful divestiture program to reduce debt from its acquisition of St. Regis Corp., Champion International Corp. will boost capital outlays 11% in 1986. Stone Container Corp. plans to increase spending 28% in 1986, following a series of major acquisitions over the past few years. Following completion of major expansion projects in 1984, Great Northern Nekoosa Corp.'s spending will climb 42% in 1986. Weyerhaeuser Co. will raise outlays 14%. ■

EXPANSIONS

Bato to make newsprint at F.F. Soucy or Bear Island

Bato Co. plans to install a newsprint machine somewhere, but it hasn't yet been decided which mill will be chosen. The company's first choice is its F.F. Soucy Inc. facility in Rivière-du-Loup, Que.

If Soucy gets the nod, the cost of the expansion would be C$230 million. Participating in the expansion project would be Soucy, Dow Jones & Co., and Rexfor, a Quebec government agency involved in forestry. Each would own an as yet undetermined amount of shares. Dow Jones and Rexfor are partners with Bato in one of the two machines at the Soucy mill, with the other machine being owned entirely by Bato.

The machine installed at Soucy would have a capacity of 200,000 tpy, doubling the mill's present papermaking capacity. Rexfor would make wood supplies available and would take a share in the new machine of between 10% and 33.3%.

The big question in the Soucy project involves possible government financing. Bato's president, Peter Brant, said that he needs federal and provincial government aid and, if he doesn't get it, he will install the machine at Bato's Bear Island Paper Co. mill in Ashland, Va.

Brant wants federal loan guarantees as well as provincial aid with wood supplies. Casting a shadow over his plan is the decision last year by Ottawa to deny aid to a proposed Donohue Inc.-New York Times Co. newsprint expansion project at Clermont, Que. This denial generally was believed to signify a new federal reluctance to continue subsidizing industry projects. ■

Saugbrugs makes a new proposal for Matane mill

The Norwegian paper company Saugbrugsforeningen sent a written counterproposal to the Quebec government on a possible greenfield mill on the Matane Peninsula, Charles Ciaccia, Quebec's Energy & Resources Minister, told the National Assembly recently.

According to Ciaccia, the counterproposal—a result of earlier negotiations between the province and the company—will be examined by his agency. After that is completed, negotiations can resume. Talks were interrupted earlier in the year because of discussions in Norway about a possible merger of Saugbrugs and another company.

The company has never discussed its plans for Matane publicly, but observers feel it is considering building a supercalendered uncoated groundwood or coated paper mill with capacity for 180,000 metric tpy in the Matane area. The proposed mill is expected to cost in the neighborhood of C$350 million. ■

Champion studying machine rebuild at Bucksport, Maine

Champion International Corp. said it has contracted with E.C. Jordan Co. to perform a preliminary engineering study and capital cost estimate for rebuilding No. 4 machine at the 1,160-tpd coated groundwood mill at Bucksport, Maine. E.C. Jordan will study raising machine speed and converting the unit from coated basestock to coated paper.

While still under St. Regis ownership, the mill had planned a similar $6-million project to boost No. 4's speed 200 fpm to 3,000 fpm and speed up No. 2 off-machine coater by 500 fpm to 3,500 fpm. That expansion project was postponed from its 1986 target date following Champion International's acquisition of St. Regis in 1984. ■

LABOR

Spending programs cut, shutdowns mulled at GN

Intent on cutting costs significantly, Great Northern Paper Co. announced it will cancel or reduce many spending programs and is studying possible paper machine shutdowns. The company also said that it will lay off more employees as part of a program outlined in January to cut staffing by 1,200 to 1,400 over the next several years (P&P, Mar., p. 27).

The amount of money that will be cut out of capital spending budgets has not yet been determined, but it is sure to be significant. Among items that will be cut are the studies on possible modernization of the Millinocket, Maine, mill. The company had been looking into a possible pulp mill modernization and rebuild of No. 11 paper machine.

Modernization of the East Millinocket mill will not be affected by the cuts. Work being done at East Millinocket, budgeted at $155 million, includes pulp mill improvements, rebuild of two paper machines, and a new finishing system. The work is to be completed in mid-1987.

But aside from that project, very little is sacrosanct. According to a general notice to employees, "capital expenditures and repair jobs in the mills and woodlands will be curtailed except for those necessary to ensure the safety of personnel, the protection of property, legal compliance, or the continuation of operations."

GN said No. 4 groundwood specialties machine at Millinocket will be shut down June 30 as previously announced. "The advisability of shutting down additional narrow paper machines that may not be profitable in the long run" is being considered as well.

In the woodlands area, "nursery, reforestation, and herbicide programs will be ended as quickly as practical." Other woodlands activities will be studied for possible reductions.

Staff to be reduced. Referring to capital spending and woodlands programs being cut, the announcement said "employees associated with all of the above activities whose services are no longer required will be separated from the payroll." GN also said that it will review other projects to find ways of cutting its salaried work force—now over 700—by 15%. ■

er. When Valmet made its unsuccessful takeover bid for Beloit Corp. late last year, state approval was in doubt. But the fact that both Valmet and Wärtsilä are Finnish companies could alter the government's view. The transaction must also be approved by the workers involved in both companies, and some taxation problems have to be ironed out.

The proposed deal with Wärtsilä is the most recent stage in Valmet's world expansion plan. It purchased Dominion Engineering Works of Canada two years ago. Valmet also formed a new company with KMW of Sweden last year. The decision to merge its paper equipment business with Wärtsilä grew out of a plan to streamline Finnish shipbuilding. Wärtsilä and Valmet have also agreed to form a new shipbuilding group, and Wärtsilä will own 70% of that company.

Valmet is also expanding its share of the process automation market with its purchase of a 20% stake in Sentrol Systems Ltd. of Canada. Of Valmet's $1.5 billion in annual sales, Valmet Automation contributes $200 million. The automation group manufactures Damatic digital distributed automation systems for process control in the forest, chemical, and food industries, as well as power plants. Valmet Automation also sells production management systems for paper mills along with measuring sensors and transmitters, including the Kajaani bleaching sensor line and Valmet consistency transmitters.

Sentrol Systems, which has US$30 million in annual sales, specializes in sensor-based supervisory control for the paper industry. Sentrol's premier product is its Sentry systems line, including sensors and control software for regulating paper quality. The two companies said they will provide "the most complete range of process control products available" for the pulp and paper industry worldwide. ■

WOOD PRODUCTS

Canadian forest fire could be costly—worst fire in years

The provinces of Newfoundland and New Brunswick have been particularly hard hit by a series of forest fires that consumed over 60,000 acres of woodland this spring. The situation improved when cool, wet weather aided the efforts of the firefighters trying to control the spread of the flames.

Although damage assessment is still preliminary, major fire damage in New Brunswick occurred to mature timber stands in the area between Newcastle and Bathurst and may affect wood supply to mills in that region. In Newfoundland, much of the burned land was scrub forest and therefore useful only as a future timber source. ■

Canada retaliates against U.S. wood tariff

While protesting that it does not want a trade war with the U.S., Canada has imposed some tariffs of its own as a reaction to new U.S. duties on cedar shakes and shingles. Both governments seem to want to put this issue aside and continue talks aimed at reducing trade barriers between the U.S. and Canada.

After the U.S. rejected Canada's demand for compensation for the tariff, Canada imposed duties on certain publications and computer parts from the U.S. These duties would raise about the same money for Canada ($61 million) as the U.S. tariffs add to shake and shingle prices in the U.S. Both countries' tariffs took effect on June 6.

The U.S. tariff will start at 35% for 30 months. It will be 20% for the next 24 months, falling to 8% for the last six months. During the tariff period, U.S. shake and shingle mills are to use profits from the higher domestic prices to improve their processes.

Finance minister Michael Wilson explained Canada's counter move: "our objective is to bring home to the U.S. the costs of protectionism, while avoiding measures that will worsen our own situation."

Even before the tariff took effect, shake and shingle prices soared in parts of the U.S. Dealers in the San Francisco Bay area reported prices up 20% in the first week after President Reagan announced the 35% duty.

■ U.S. trade officials will investigate a complaint that Canada subsidizes its softwood lumber industry. Should the Commerce Dept. agree with U.S. lumber producers' charges, it could order up to $1 billion of trade penalties on $4 billion worth of annual imports. The Commerce Dept. said that it will rule by July 3 on a petition by the U.S. Coalition for Fair Lumber Imports seeking a 27% countervailing duty on Canadian softwood lumber entering the U.S. duty-free. ■

INTERNATIONAL TRADE

Europe's output in 1985: little change in production

Production of paper and board in 1985 reported by the European Paper Institute for its 13 member countries was 45 million metric tons, a marginal increase of 0.5% over the very high levels reached in 1984. Paper and board consumption in the EPI countries was 42 million tons, a decrease of 0.5%. (See accompanying table for production and consumption of each country.)

The EPI also reports output by major paper and board grades (000 tons): graphic paper, including newsprint, 22,695 (up 1.5%); packaging papers and corrugating, 12,618 (down 1.0%); sanitary, household, and special papers, 3,382 (down 2.0%); board, not including building board, 6,374 (up 2.0%).

Pulp production last year, according to the EPI, totaled 2.56 million tons, down 0.2% from 1984. Leading pulp-producing countries (000 tons) were: Austria, 1,196 (up 8.5%); Finland, 7,739 (up 0.2%); France, 1,939 (down 5.1%); Fed. Rep. Germany, 2,048 (down 0.6%); Norway, 1,835 (up 5.1%); and Sweden at 9,079, down by 1.0%. Pulp consumption of 2.94 million tons was 0.7% above consumption in 1984. ■

1985 paper/paperboard production and consumption for 13 western European countries.

Country	Production	Consumption
Austria	2,127	982
Belgium	841	1,629
Denmark	321	927
Finland	7,445	1,296
France	5,343	6,675
Germany[1]	9,150	10,590
Ireland	26	281
Italy	4,587	5,244
Netherlands	1,904	2,495
Norway	1,604	583
Sweden	7,003	2,002
Switzerland	1,019	1,161
U.K.	3,681	7,826
Total	**45,051**	**41,691**

1. Fed. Rep. Germany

Source: European Paper Institute.

GOOD NEWS FOR BLEACHERS: Ample supply, no new price hikes

Consumption. Although few chemical pulp mills have been built recently and none are planned, use of bleaching chemicals still rises. Last year, consumption was flat until a late-season rush due to improved pulp markets that are still in evidence today. Many analysts hold a bullish view for the rest of 1986. Current stimuli are the opposite of those causing a poor market in 1983-84: a weakening dollar, improving domestic consumption, and reduced inventories. All seem to be shaping up well—so well that market pulp prices have begun to take off.

Pulp mills are using more chemicals because they are running at higher utilization rates. A few have recently taken downtime, mainly to reduce inventories. P&P's bleaching survey (see p. 47) indicates that use of chlorine, caustic, and sodium chlorate all rose slightly in 1985 compared with 1984—a trend that will continue in 1986 if operating rates stay high.

The rise in consumption can also be attributed to two new pulp mills in 1985. New capacity is planned at eight U.S. sites and two in Canada. No new fully bleached chemical pulp mills will open in 1986.

Substitution chemicals such as oxygen, peroxide, and chlorine dioxide (in chlorination) remain popular. Growth of oxygen use in the first caustic extraction stages seems to be leveling after tremendous success earlier in the decade. However, renewed attention is being paid to oxygen delignification. P&P's survey found at least three lines employing new postdelignification processes using oxygen in 1986, while three mills expressed interest in adding these units in the near future. This confirms an industry desire to bleach pulp in shorter sequences with less effluent. Perhaps the driving force will not be stricter government regulations or pulp market conditions, but production needs and self-initiated pollution abatement for internal cost reduction.

Peroxide use, too, is growing. DuPont experts have noted that some 30 mills in the U.S. use hydrogen peroxide in the first or second extraction or en route to storage. As experience with hydrogen peroxide in such uses rises and price stability is retained, the trend should continue.

Chlorine dioxide substitution in chlorination is at the crossroads in bleaching. A few mills use moderate to high substitution, but most seem to favor only small amounts (below 1% of chlorine). Although almost 80% of the mills practice some substitution, the growth of chlorine dioxide use in chlorination is and will remain nearly flat. The competition among substitution chemicals does not favor chlorine dioxide because its use is limited to the unit producing it. When pulp mills began using chlorine dioxide in the C-stage, they were pushing their generators to full capacity. The cost was greater and might have augmented other substitution chemicals (peroxide and oxygen use reduces chlorine dioxide consumption). In any event, the survey found little interest in using higher substitution rates in the future.

TABLE 1: **U.S. and Canadian consumption and prices of chemical pulp bleaching chemicals.**

U.S.	**Chlorine**	**Caustic**	**Chlorate**	**Peroxide**
1985 consumption (000 tons)	1,600	1,880	210	9
% change from 1984	10	−4	—	5
1985 dollars per ton	195[1]	175[2]	420[3]	645[4]
% change from 1984	—	−40	—	—
% change for 1986	—	10	—	—
Canada[5]				
1985 consumption (000 tons)	506	499	186	1.8
% change from 1984	0.8	1	−7.2	—
% per year growth, 1986–88	2	0.5	12	

1. f.o.b. Gulf Coast, freight equivalent. 2. 50% liquid basis, f.o.b. Gulf Coast, freight equivalent. 3. Bulk container, f.o.b. works (now listed in crystal form in 450-lb drums at $0.27/lb. 4. 50% solution, tankcar, freight equivalent. 5. From *Corpus Chemical Report.*

Price, availability. There have been some changes in price and availability of chlorine, caustic, and sodium chlorate, but they will not be a great concern to pulp mills now or in the immediate future. The price of chlorine rose 20% in the past seven months, with delivered cost reaching $130/ton. Producers maintain that on an ECU basis, the rise does not make up for previous declines, particularly since the price of caustic is still down. Mills using chlorine will find the price reflecting demands for polyvinyl chloride and vinyl chloride monomer, which are related to the housing and automotive industries. The recent hikes may also be due to reduced chlorine capacity. Since late 1984, over 400,000 tpy has been taken out of the market, with three plant closures in 1985 and only one major expansion announced for 1986 (OxyChem's Taft, La., plant).

Chloralkali producers are also developing membrane technologies to cut production costs and make higher-quality grades. Operating rates were 84% in 1985—up three points over 1984—and the jump should be similar this year. Caustic demand is still low. Oversupply and slow markets have made it impossible to boost prices.

The sodium chlorate market has been oversupplied in the past 18 months. The overall supply situation has helped mills to get $50 to $100/ton discounts off lists, depending on the receiving point. Expansion of three plants and startup of a new facility, all in Canada, have changed market attitudes, especially if the above developments continue. Two U.S. plants have closed and only one has expanded. The marketplace is further complicated by power cost advantages (for Canadians) for production of sodium chlorate and government subsidies for power and transportation. Many producers are sending the dry product south for conversion to the delivered form (liquid), aided by mills installing equipment that can receive the dry product, saving several dollars per ton. It would be "unrealistic" to even imagine a price rise in 1986, as one producer put it.

Substitution chemicals are also in ample supply, and no price hikes are likely for the rest of 1986. ■

ISSUE FOCUS: **BLEACHING**

EFFORTS IN CHEMICAL PULP BLEACHING TECHNOLOGY EMPHASIZE CUTTING COSTS

P&P's third annual survey of bleaching equipment finds fewer new systems; emphasis is on washing, process control, chemical additions

By MICHAEL J. DUCEY

Bleaching chemical pulp has been and continues to be a major strategic area for reducing production costs. While equipment suppliers slowed their offering of new systems during the past 12 months, that can be construed as a tribute to the last ten years of product development and market acceptance. North American pulp mills have improved their operations with dynamic and static mixers, sensors and controls, innovative chemical additions, etc., gaining a more efficient process and reducing operational costs. Yet the market is by no means saturated, and suppliers can look forward to a strong, competitive environment in finishing out the 1980s.

Before a discussion of process equipment and chemical consumption, a word of thanks is extended to those who have participated in the survey during the last four years (*P&P*, Nov. 1983, p. 53; Oct. 1984, p. 56; June 1985, p. 56). Some 150 people from mills, research centers, and allied industries in North America have made great contributions to this effort. Each receives a copy of *P&P*'s chemical consumption report, which now represents over 75% of the bleached tonnage in the U.S. and Canada. The work will be updated in the fall of 1986 and could incorporate the European countries by the end of the year.

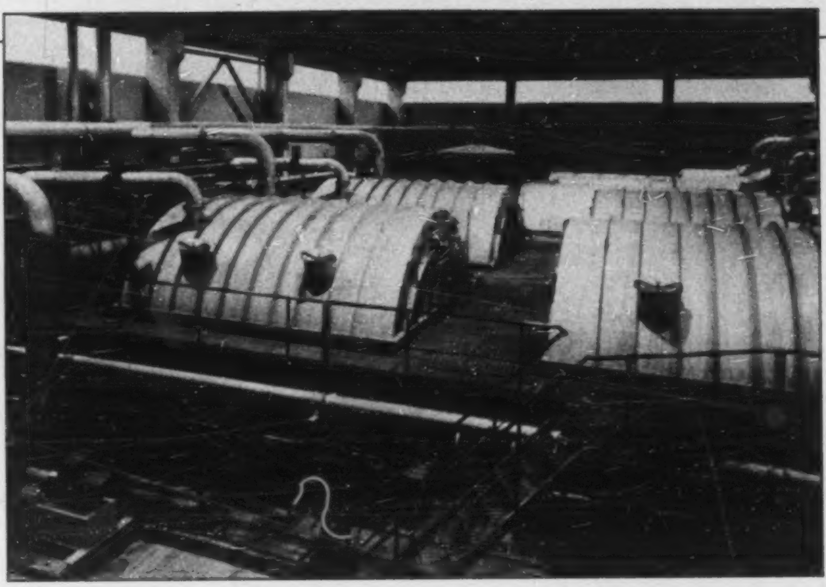
CHEMICAL CONSUMPTION. As stated in the chemical report (p. 39 of this issue), an incremental rise in consumption was recorded for chlorine, caustic, and sodium chlorate in 1985 (about 2% over 1984, total). Oxygen, peroxide and sulfur dioxide, used in smaller quantities, experienced healthy gains in consumption due to their ability to reduce bleaching costs while maintaining or improving quality. As it stands now, consumption of commodity chemicals follows production, and production did not change much from the previous year. Two new pulp mills, Champion International Corp.'s hardwood market pulp mill in Quinnesec, Mich., and Union Camp Corp.'s plant in Eastover, S.C., helped offset the consumption loss due to efficiency gains made by the mills with new equipment and modification of the bleaching sequence. According to *Pulp & Paper Project Report*, total bleached kraft capacity expansions announced for 1986 are close to 200,000 tpy for the U.S. and 35,000 metric tpy for Canada. Another 1 million tpy could be online by 1990. Pulping expenditures by the industry amount to $1.6 billion, or 20% of the total capital spending program for the next three years. Bleaching improvements account for nearly 30%.

MIXING. The four major suppliers, Kamyr, IMPCO, Sunds Defibrator, and Rauma-Repola (represented in North America by Beloit), have had a lot to cheer about since they introduced new mixing equipment six years ago. Dynamic mixers were accepted quickly (relatively speaking for the paper industry) and most of the bleaching lines covered in the survey have had at least one installed for chlorination, oxidative extraction, or chlorine dioxide stages. The mixers have really proven to be worthwhile. Their cost justification is fixed inside of a year, product quality enhancement is evident (mostly in brightness gains), energy costs do not affect overall bleaching cost, damage to the fibers is minimal, and chemical consumption is reduced by more efficient mixing (the major factor in the ROI equation).

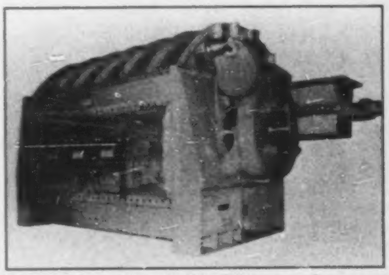
Dynamic mixers have allowed mills to re-evaluate totally their bleaching sequences. In the chlorination stage, mixers can help with the premixing or sequential addition of chlorine dioxide, particularly in high-substitution situations. In caustic extraction, mixers provide

TABLE 1: **Survey participation breakdown.**

Individuals	
Mill	110
Supplier	45
Other	4
Number of lines	104
Tonnage represented	(capacity)
U.S.	16,500,000 short tpy
Canada	6,500,000 metric tpy



Four Pro-Feed washers situated in a parallel line produce 1,000 a.d. metric tpd of softwood kraft and 1,100 a.d. metric tpd of hardwood kraft. The units were installed in 1985.



The Compaction Baffle Filter can be installed in any pulp mill process in single or multiple stages that involves the washing of chemicals from pulp.

the vehicle for oxygen enrichment. In latter-stage chlorine dioxide bleaching, mixers help to squeeze out the last bits of color, effectively increasing final brightness.

Single stages have not been the only beneficiary. A few mills have had the opportunity to form parallel bleaching lines out of a single line. Short-sequence bleaching is now a consideration for mills of all sizes, particularly for those deciding on replacing an existing line. The shortened process uses less energy, chemicals, and manpower (maintenance). More mills will use dynamic mixers to accomplish this modification. The survey found at least three mills actively studying this for near-future application.

Mills that have installed a mixer seem very satisfied with a single stage and may not need another one unless they are evaluating the entire line for replacment. Therefore, the growth of the market for dynamic mixers may flatten over the next several years. The challenge for suppliers now lies in convincing smaller mills to install the equipment. Capital investment costs are holding smaller mills back since unit cost, installation, and startup are fairly expensive. Space constraints are also restricting purchasers for some bleacheries.

Another factor that is influencing mixer sales is competition from pumps. Kamyr's MC pump is proving to be an effective mixer, seemingly applying the shear forces necessary for proper fluidization (mixing).

There have been a few installations of static mixers in North America supplied by Komax Systems. These mixers have a unique element design that forms vortices, or backmixing, which has been effective for the mills that have employed it. There are no moving parts, the unit is easy to install (fitting right into a pipe), and it is inexpensive—approximately one-fortieth of the cost of a dynamic mixer. Sales have been slow, mostly due to light acceptance in the marketplace. Static mixers have received a bad reputation over the years for separating fluids instead of mixing, but the Komax unit is sound, according to the mills that use them. The benefits are similar to those of dynamic mixers but on a smaller scale. They do not reduce shives as well, but they do reduce chemical costs (for oxidative extraction) and improve quality. It is too difficult to estimate just how many static mixers will be sold in the coming years, but with wider use comes wider acceptance, especially in the pulp industry.

OXYGEN IS BACK. The survey showed clearly that oxygen delignification (first stage) is once again the No. 1 choice of mills installing new systems. Over the past five years, most new lines have been either conventional five-stage (Champion International Corp.'s Quinnesec mill, Great Northern Nekoosa Corp.'s Leaf River mill), or displacement (Crown Zellerbach's Camas, Wash., mill, International Paper Co.'s Georgetown, S.C., mill). History helped dictate this trend, with Chesapeake's rather unique design (C_D) receiving lukewarm attention (although the system continues to run well) and, of course, the initial problems at IP's Ticonderoga, N.Y., mill, currently under fire from Vermont environmental authorities.

But the situation has changed. The survey reveals that two oxygen systems will be installed by year-end (at Consolidated Papers and at Champion's Pensacola, Fla., mill). Several survey participants also indicated their preference for oxygen delignification when asked about choosing a new system. The two being installed this year are employing the parallel or split sequence retrofit currently used by two other mills in the U.S.

When the participants who preferred oxygen delignification were asked to explain their preference, various reasons were offered. The cost justification was based on lower operational costs attributed to less chemical cost. Cheap oxygen applied in heavy doses (combined with metal inhibitors) reduces the kappa number to half that of conventional systems. This means far lower chemical charges in the latter stages, which reduces bleaching cost (oxygen is still very cheap) and effluent treatment cost. Effluent components discharged are typically half that of conventional systems.

Capital cost for oxygen delignification is fairly high. Process equipment includes a large reaction vessel and powerful transport equipment (bleaching consistencies are in the medium range). Survey participants liked the idea of having a common oxygen reactor installed before a split sequence. This concept may boost sales efforts by allowing the systems to be offered as retrofits where space allows.

Other pretreatment systems have been explored in recent years. The most significant one in North America is the 25-tpd ozone reaction vessel now operating at the Weyerhaeuser research facility. The vessel is the largest of its kind and should provide the data needed to evaluate a commercial system. There has been no further word from the Japanese on their development efforts for an ozone generator, which is a major concern due to the rather high-cost techniques employed today for onsite ozone generation. Another research effort being directed for commercial application is nitrogen dioxide as a bleaching agent. This chemical is attractive because of its high reactivity with lignin, but its effect on pulp strength has been questioned. Both ozone and nitrogen dioxide produce effluent-free byproducts, which is a major driving force in continuing research.

OTHER NEW LINES. IMPCO is currently marketing a new bleaching line utilizing their Compaction Baffle Filter, an innovative vacuum washing vessel. The filter, operating under pressure, is smaller than other washers and can be received factory-assembled. So far the idea has been accepted by two mills (Mead Corp.'s Chillicothe, Ohio, complex and as part of IP's modernization program at Mobile, Ala.). The system is said to be cheaper (15% to 20%) than other short-sequence plants available today. The bleaching line would consist of three washers in combination with the High-Shear mixers introduced a few years ago.

The Compaction Baffle Filter (see *P&P*, Nov. 1985, p. 65) is designed to use less water and power while discharging less effluent. Inlet consistency is 4%, compared with the 1% to 2% levels currently employed in most systems. Discharge consistency is 13%. This reduces piping and valve requirements as well as horsepower consumption and lowers effluent discharge due to the water reduction. Other advantages claimed by the supplier include lower maintenance, less electrical cost, reduced foaming, less odor, and many others. *Pulp & Paper* hopes to publish a full report on one of the first commercial applications in the near future.

Chasing IMPCO in this washer market is Rauma-Repola, supported by Beloit in North America. Its Pro-Feed washer, like the IMPCO unit, requires no barometric dropleg, allowing for a low-to-the-ground design. Inlet and discharge consistencies are also similar to the IMPCO design. The concept promotes shorter bleaching lines, less effluent, and requires less power and space. The equipment has been successful worldwide but there are only a handful of installations in North America. Beloit mentioned that most inquiries from mills specify production increases for future capacity expansions as well as ongoing interest in turnkey systems. Many mills are actively pursuing washers and mixers, it is said, but the decision-making process is rather slow.

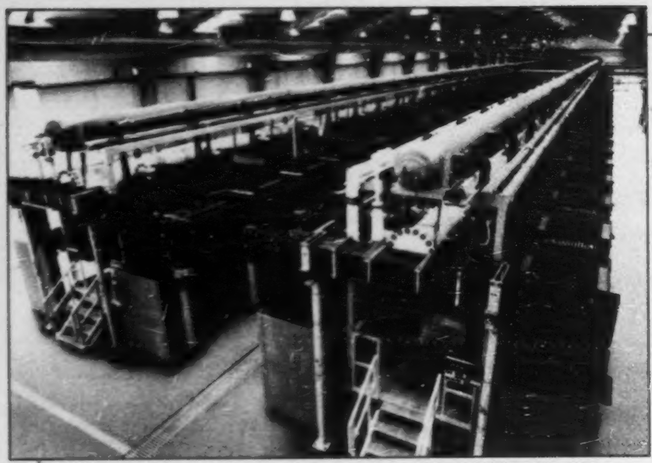
Sunds Defibrator has begun marketing efforts on the displacement press as an alternative to conventional vacuum filters. The first unit is being installed in a Swedish mill. Advantages of the displacement press include high washing efficiency, low building level, low washwater requirements, and smaller filtrate tanks.

CHEMICAL GENERATING. With all the recent sequence modifications, equipment for onsite chemical generators has also been a point of interest. The latest equipment entries have been in chloralkali units from MoDo Chemetics and a soon-to-be-announced system from Lurgi. These units utilize innovative membrane technologies similar to the ones accepted by the major chloralkali producers. One MoDo unit was sold two years ago to Procter & Gamble in Wisconsin, and Lurgi says it is close to a sale in Europe. Unfortunately for these manufacturers, chemical cost is predicted to remain stagnant for the next couple of years, which could hamper sales efforts.

The situation for chlorine dioxide generating equipment is very interesting at this time. Mills that have installed an E_O stage have reduced ClO_2 charges, thus freeing capacity for use elsewhere. Some have directed the extra chemical to papermaking systems for biological retardation, while others have merely shifted ClO_2 further up the line. A TAPPI subcommittee report stated that in 1983 some 20 mills worldwide have C-stage substitution levels in excess of 25%. Last year's survey found 12 mills in North America using this technique.

Pulp & Paper was fortunate to have interviewed Kemanord in Sweden just before this issue went to press. That country is currently reviewing environmental permits for pulp mills—an event occurring every ten years or so—and two mills have received their new limitations. It seems that studies of the Baltic Sea have revealed excessive levels of toxic chlorine compounds, possibly affecting the life cycle of the area (evidence found includes a correlation of baby seal death and expanding toxicity). A joint effort is being undertaken by Finnish and Swedish authorities, and from the looks of the new permits, major reductions in effluent discharge having worldwide effects could be forced upon the industry. A Jaakko Pöyry release described a meeting attended by the top minds in bleaching where the discussion prophesied the Swedish government could mandate intensive effluent treatment for all discharges and/or require a fixed kappa number for chlorination.

The two mills mentioned above are located in south-



New membrane plant cell room at Occidental Chemical Corp., Taft, La., was part of a $30-million project.

ern Sweden, and each has been asked to reduce its discharge of total organic chlorinated compounds (TOCl) to one-half present levels (ranging from 1.5 to 2.0 kg/day). It should be noted that Swedish pulp mills currently use oxygen (in 70% of all tonnage) more than any other country (including their Baltic neighbor, Finland) and thus produce fewer chlorination byproducts. Chlorine charges are typically in the 30 to 35 kg/metric ton range, and now need to be cut by two-thirds (10 to 15 kg/metric ton). Therefore, a lot of ClO_2-generating capacity is available, and high C-stage substitution is possible. The situation is not the same in North America or Finland.

Should the studies prove that the toxics are connected with the chlorination stage in pulp mills, most mills will need to pursue ways to eliminate these discharges. In North America, this would mean the expansion of current ClO_2 generating plants, either by retrofit or small-scale design and installation. Capital investment would direct the decision. Then the high substitution levels that have been highly publicized in the literature or intense prebleaching concepts would be adapted in most locations. Kemanord believes that these developments have wide implications and is actively involved in this study.

Chlorine should not be counted out yet. It is still a fairly inexpensive, easily delivered and applied chemical, and its availability is vast. Last year Douglas Reeve presented a paper on the development of a laboratory-scale device that has given favorable results. *P&P* is closely following this work.

PROCESS CONTROL. Perhaps the largest and steadiest growth in sales to North American bleacheries is in process control equipment. Mills are very interested in gaining all the data necessary to make a sequence modification and, once that is accomplished, in finding out exactly what the return is. Brightness and residual chemical sensors, already having replaced ORP meters in the C-stage, are now being applied to the latter stages. In that interview with Kemanord, it was noted that mill trials in Sweden have provided data that show the final two stages are actually more important than initial bleaching. Should this attitude prevail, it would further support the conclusion that use of sensor and control equipment in bleacheries will remain strong.

An inquiry to Eur-Control USA revealed another interesting trend. Eur-Control reported that its Opticon Consistency transmitter is a "hot item" as mills seek to gain information continuously not only on washing efficiency but also on stock consistency control for washers. This product seems to fit well with the market direction of bleach plant equipment development stated above.

Eur-Control also reaffirmed *P&P*'s assessment of oxygen delignification and good overall growth in bleaching apparatus purchases (including mixers). Their products in those applications continue to show strong signs of increased usage. All these units tend to pay for themselves over a short time period (similar to mixers) through savings in bleaching costs. There are a number of suppliers in this area and previous contacts have indicated a similar viewpoint.

Supervisory control has also been beneficial for many mills, but so far only for those with the large amount of capital required. Measurex and AccuRay tend to be the leaders in sales since their product lines encompass brightness and residual sensors as well as the computer control and monitoring hardware and software. Growth of sales may depend on how well the industry performs in the short term, but it is believed that the larger mills (500 tpd) will eventually find the necessary capital to install supervisory control systems.

FURTHER STUDY. Several studies have been conducted to assess processes to effectively treat the effluent loads produced by today's chemical bleacheries. However, only one mill in North America has attempted a closed-cycle pulp mill and that appears to be a failure, although significant knowledge and insight are now available about the concept because of the mill trial. Work continues in the ultrafiltration, reverse osmosis, and ion exchange areas, but still without industry application. Many mills have implemented programs to curtail some effluent discharge through recycling of filtrates. The survey showed chlorination filtrates are getting applications in brownstock washing, oxygen prebleaching, and countercurrent cycles by a large number of mills. This has been a standard for all new lines for quite a while.

A study was released by researchers at Paprican at the 1985 TAPPI Pulping Conference on the results of analysis of filtrates taken from ultrafiltration and reverse osmosis treatment of bleach plant effluents. Three streams were produced and their concentrates were separated using diafiltration techniques. The reverse osmosis filtrates were found to be suitable for bleach plant recirculation. Chloride-rich filtrates processed through diafiltration were determined to have potential in generating sodium chloride and chlorine dioxide, while the organic material could be incinerated. ■

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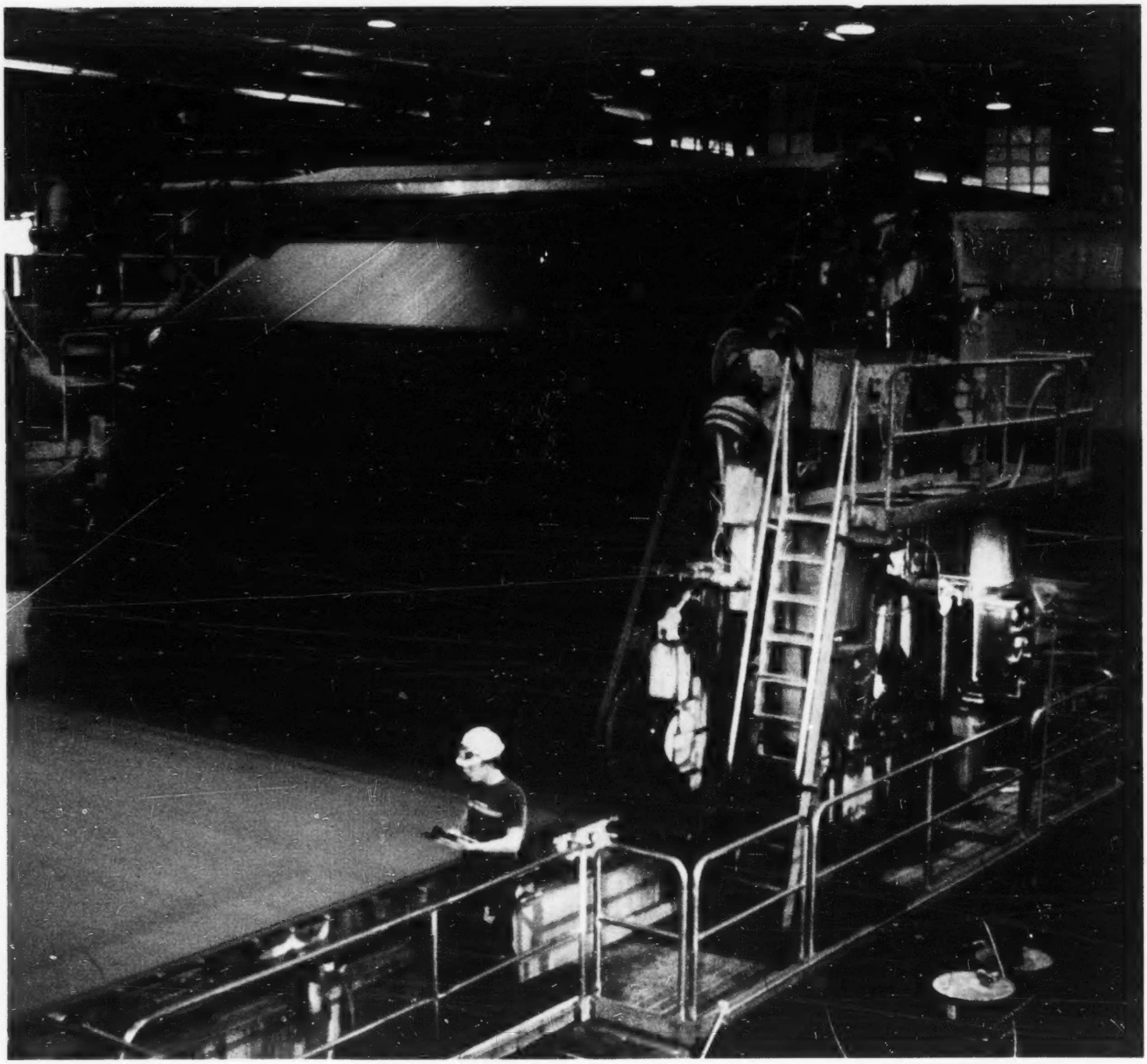

COVER STORY:

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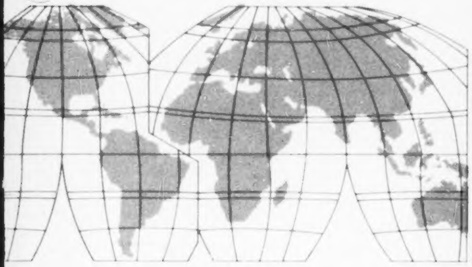

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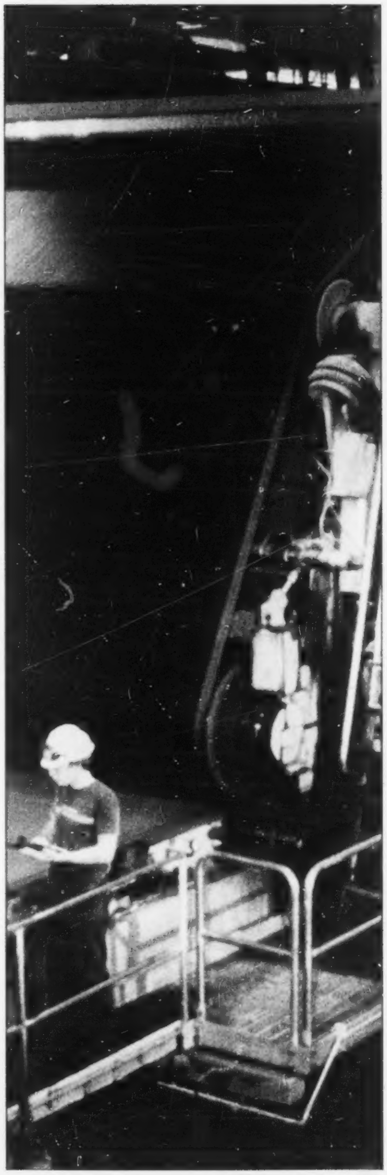

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World's first machine to produce 100% recycled newsprint has been upgraded to a twin-wire configuration at Garden State Paper, Garfield, N.J. **(Photo courtesy of Garden State Paper.)**

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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ABP BPA

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Circulation Department, PULP & PAPER,
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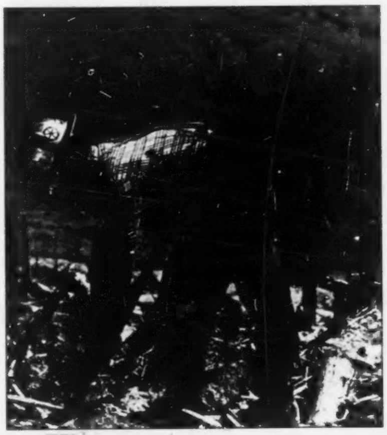

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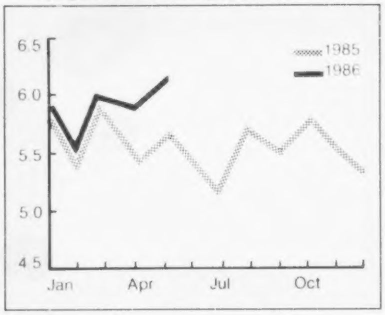
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard in May totaled 6.1 million tons, up 5.5% from the same month last year, according to American Paper Institute data. The trend of production continued at a record pace, as the annualized rate jumped to 70.5 million tpy for the month, a solid 4.4% higher than last year's total. Preliminary data show that trend continuing into June.

Among major grades, production through May is up in everything except packaging and coated papers. Led by impressive gains in uncoated free-sheet, printing and writing papers were up 3.0% for the month from very strong levels in May 1985. Rising 6.3% overall, paperboard grades are particularly strong thanks to healthier export markets and strong domestic demand. The turnaround in unbleached kraft linerboard exports is particularly dramatic, with production for export jumping 17.7% in May. Although down slightly from April, corrugated box shipments in May set a new record for the month.

Canadian newsprint shipments totaled 771,000 tons in May, up 3.5% from last year. Strong consumption is reflected in the 7.0% drop in inventories of Canadian newsprint at U.S. plants. Woodpulp shipments through May were up 13.2%. ■

PAPER & PAPERBOARD PRODUCTION[1]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Newsprint	May	492	6.7	5,589	1.6
Uncoated groundwood (s)	May	120	3.4	1,489	−0.1
Coated paper (s)	May	497	0.2	6,044	−3.8
Uncoated free sheet (s)	May	876	6.4	10,414	7.7
Other printing/writing	May	116	1.8	1,381	2.4
Total packaging and other paper (s)	May	453	2.0	5,238	−0.4
Tissue	May	456	8.8	5,145	4.6
Total paper	**May**	**3,009**	**4.8**	**35,300**	**2.5**
Unbleached kraft paperboard	May	1,530	7.9	17,365	4.9
Semichemical medium	May	457	6.0	5,275	4.5
Bleached paperboard	May	373	13.7	4,330	9.1
Recycled paperboard	May	705	−0.4	8,267	8.8
Total paperboard	**May**	**3,065**	**6.2**	**35,237**	**6.3**
Total U.S. paper and paperboard output	**May**	**6,074**	**5.5**	**70,537**	**4.4**

PULP, WASTEPAPER & FIBER[2]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Total U.S. woodpulp production	Apr.	4,604	4.8	56,101	2.7
Market pulp production	Apr.	590	4.8	7,310	4.1
Wastepaper consumption at paper/board mills	Apr.	1,345	8.0	16,329	5.7
Pulpwood consumption (cords)	Apr.	7,742	8.3	91,083	4.0

CONVERTED PRODUCTS STATISTICS[3]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Corrugated box shipments (billion ft^2)	May	23.365	4.7	116.487[6]	3.9
Containerboard inventories at U.S. box plants and mills	May 1	2,438	−18.4		

INTERNATIONAL TRADE[2]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
U.S. paper imports (including products)	Apr.	854	−9.1	11,095	−1.3
Imports of Canadian newsprint	Apr.	626	−12.2	8,067[6]	−2.3
U.S. paper exports (including products)	Apr.	408	16.2	4,604	15.0
Exports of unbleached kraft linerboard	Apr.	198	39.4	2,113	23.7
Exports of woodpulp	Apr.	358	9.1	4,443	18.5
Norscan pulp inventories[4]	May 30	1,077	−26.5		
Norscan pulp operating rates[4]	May	88%	86%	90%	89%

CANADIAN STATISTICS[5] *(reported in metric tons)*

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Total newsprint shipments	May	771	3.5	3,734[6]	−0.5
Operating rates	May	94%	94%	92%	94%
Inventories held by U.S. consumers	May 30	1,378	−7.0		
Other paper/board shipments	May	504	5.2	2,481	8.6
Woodpulp shipments (export only)	May	612	4.4	3,162[6]	13.2
Operating rates	May	92%	83%	91%	87%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

BLEACHED PAPERBOARD: Dollar is key to continued strength overseas and domestic price stability

Grade structure: Solid bleached sulfate (SBS) paperboard is used primarily in folding carton and milk carton stock. Secondary uses include file folders, linerboard, lightweight and heavyweight cup and round nested food containers, plate, dish and tray stock, and other packaging and nonpackaging uses. Calipers range from 10 to 28 pt. in low-, medium- and high-density levels. Basis weights vary from 120 to 300 lb/3,000 ft². About half of the SBS produced is coated.

Production/capacity: Production in 1985 was down 1.9% to 3.97 million short tons after having risen over 10% in the previous two years to 4.05 million tons in 1984, according to the American Paper Institute. As a result, operating rates fell to 90.8% in 1985 from 96.7% in 1984, a record year. Exports, however, have steadily declined in recent years. Last year, they fell again, to 459,000 tons from 478,000 tons in 1984.

Operating rates held up relatively well last year despite the downturn in demand and an additional 190,000 tons in capacity that came onstream through various machine upgrades. Production remained depressed through much of the first three quarters of 1985 but began to pick up rapidly in the final three months as the U.S. dollar weakened in relation to other currencies and export orders increased.

By end use, 1985 production of milk carton stock fell 5.7% to 608,000 tons; folding carton stock was down 1.7% to 1.816 million tons; plate, dish and tray stock was relatively flat with a 0.5% decline to 289,400 tons; heavyweight and lightweight cup, round nested food containers, and cup lids were up 3.6% to 431,500 tons; linerboard was down 3.8% to 114,000 tons.

For the first four months of 1986, SBS production rose 6.4% from a year earlier. Milk carton stock production was up 14%; file folder, up 13%; plate, dish and tray, up 10%; folding carton, up 5.8%; heavyweight cup, up 1.9%; and bleached linerboard, up 1.2%, according to industry reports.

Outlook: With an additional 175,000-tpy machine starting up at Westvaco Corp.'s Covington, Va., mill in March, and an estimated additional 242,000 tons of capacity expected to come online by 1988, operating rates could remain relatively low.

Much depends on currency exchanges and national economies in international markets, as well as product mixes at individual domestic mills. According to API, 112,000 tons of the additional capacity slated to start up during 1986-88 represent machine swings from production of bleached kraft pulp from SBS board, which can be altered on short notice.

Another variable in the market's stability will be the final plans for Federal Paper Board Co. Inc.'s No. 3 machine at the Augusta, Ga., mill. The company is studying a possible expansion there that would increase capacity by about 150,000 tpy.

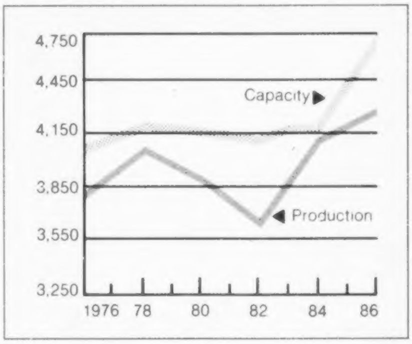
API forecasts SBS capacity will rise by 289,000 tons this year and 129,000 tons over the next two years, reaching 4.792 million tons in 1988.

Production is expected to rise 8.1% this year to 4.292 million tons, with the biggest increases occurring in folding cartons, nonpackaging, and linerboard. Exports should remain good if the dollar does not strengthen. An increase in capacity to 4.664 million tons, however, should keep operating rates at about 90.0%.

Prices: Steep discounting that had reduced transaction levels to as low as $500 in 1985, with some spot market offerings even lower, began to disappear during the final weeks of last year. By April of this year, most bleached board producers succeeded in implementing hikes. This brought the range to $550/$600 from $530/$600 for the bulk of business. More hikes were posted for July to increase levels to $570/$600.

SBS 15-pt coated folding carton board (rolls), $/short tons, year end: 1973, $300; 1974, $360; 1975, $360/$365; 1976, $385; 1977, $405; 1978, $425/$445; 1979, $490; 1980, $550; 1981, $625; 1982, $590/$625; 1983, $590; 1984, $590/$665; 1985, $550/$590; 1986 (June), $550/$600. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

	1984	1985	1986e
Production	4,048	3,972	4,292
Capacity[1]	4,187	4,375	4,664
Utilization rate	96.7%	90.8%	92.0%
Imports	—	—	—
Exports[2]	478	459	496
Apparent U.S. consumption	3,570	3,513	3,796
lb/capita	30.20	29.43	31.52
GNP ratio	1.02	0.98	1.04

e = Estimate.

[1] Because of grade switching, capacity utilization is difficult to define.

[2] API production for export.

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity	Market share (%)
1. Federal Paper	825	17.7
2. International Paper	750	16.1
3. Westvaco[1]	540	11.6
4. Potlatch	532	11.4
5. Temple-Eastex[2]	357	7.6
6. Champion Intl.	250	5.4
7. James River	219	4.7
8. Weyerhaeuser	200	4.3
9. Gulf States	190	4.1
10. Gilman Paper	175	3.7

Market share of top five companies:
64.4%

Market share of top ten companies:
86.6%

Total U.S. capacity (1986):
4.664 million short tons

[1] Brought online in March 1986 a new 175,000-tpy bleached board machine at the Covington, Va., mill.

[2] Does not include 112,000 tpy of bleached bristols.

"The sale also means that we will be able to redirect significant capital resources to high-tech processes and production equipment at our remaining three mills and 20 box plants," he noted. "Our objective will be to become the marketing and quality leader in the corrugated box industry, not the growth leader." Examples of this are O-I's Proprint preprinted linerboard and its Ultrastak high-performance containerboard, and Compak computer-aided packaging design.

Robert J. Lanigan, O-I chairman and CEO, cautioned in a recent interview that the forest products unit's profit recovery may not be as rapid as some analysts project. "There's no question that forest products have turned around and are improving—it's a matter of how long it takes to execute an increase in the price of linerboard." Linerboard, which sold for as low as $250/short ton last year and now sells for about $290/ton, will increase in price to the range of $315 to $320/ton—but not until August, he said.

Lanigan said that O-I's overall capital spending would be slightly under $250 million for 1986—down from $260 million last year—and should be in the $200- to $250-million range next year. Part of those expenditures will be going to the forest products division, but "we avoided a big one by selling our Orange, Texas, mill," Lanigan noted. ■

Stone pursues talks with Jacksonville Kraft Paper

Stone Container Corp. has signed a letter of intent with Abraham Zion, owner of Jacksonville Kraft Paper Co. Inc., to manage the idle Jacksonville, Fla., linerboard and kraft paper mill. Stone will manage the mill only if it has been returned to working condition, the required operating permits have been obtained, a union agreement satisfactory to Stone has been reached, and "satisfactory capitalization" has been supplied by Zion.

As reported earlier, these conditions will be hard to fulfill because the mill was shut down last fall before its tanks and recovery boiler were emptied (*P&P*, July, p. 23). Improvements to the power boilers are also needed before particulate emissions are within legal limits.

If these conditions are fulfilled, Stone will manage the mill and collect a management fee. It will have an option to buy a 50% or 100% equity in the mill after five years at a price to be determined at that time. The mill has capacity for 333,000 tpy of linerboard and 123,000 tpy of kraft paper.

■ **Boise Cascade Corp.**'s purchase of the Jackson, Ala., pulp and paper mill of the Allied Paper Div. of Hanson Trust plc closed on July 1. Hanson plans to sell the rest of Allied Paper, which it acquired from SCM Corp. earlier this year, including a 415-tpd nonintegrated coated and uncoated paper mill in Kalamazoo, Mich. Also for sale is SCM Allied/Egry Business Systems, which owns about seven continuous business forms plants. A spokesman for Allied Paper said that Hanson is not actively soliciting buyers at this time, but that the future sale of these units is planned. ■

Abitibi-Price sells idle Stephenville pulp mill

Abitibi-Price Inc. has sold the machinery of its idle kraft pulp mill in Stephenville, Nfld., to a company called SIDFRA, based in France. SIDFRA has divided the machinery into ten operating units and is soliciting buyers for the equipment, which includes two Kamyr continuous digesters, a wood preparation plant, screen rooms, a stock preparation plant, a drying machine, the recovery boiler, and the entire recovery system.

The kraft pulp mill was built by the now defunct Javelin Paper Corp. to produce furnish for unbleached kraft linerboard. It operated during 1973-76, at which time Abitibi-Price bought the property and converted the linerboard mill to newsprint production, subsequently idling production at the kraft pulp mill. ■

MERGER BRIEFS

■ **DuPont Co.** announced that it will sell its U.S. cellophane business to Flexel Inc. for an undisclosed amount. DuPont said that the sale of its cellophane plant in Tecumseh, Kans., represents its withdrawal from the cellophane business. The 240 employees affected by the transaction will be offered jobs by Flexel. Flexel, of Atlanta, Ga., recently purchased Olin Corp.'s Covington, Ind., cellophane plant.

■ **Imasco Ltd.** said it is soliciting bids for **Genstar Corp.**'s nonfinancial assets, including its building products division. This spring, Imasco acquired Genstar (*P&P*, May, p. 23). It is selling these assets in seven or eight packages and said that it hopes to have completed all sales in two years. The company intends to hold on to Genstar's financial services businesses, including Canada Trustco Mortgage Corp., Canada's largest trust. Imasco expects its profits next year to exceed those of 1986, despite a decline in earnings at its Imperial Tobacco Ltd. subsidiary. Imasco's purchase of Genstar reportedly has made a "somewhat positive contribution" to Imasco's 1986 earnings.

■ **Mosinee Paper Corp.** has adopted a poison pill plan to deter takeovers. The plan allows holders of common stock to purchase shares in a surviving company for half price. ■

COATED GROUNDWOOD

Rise in paper use seen by magazine publishers

Publisher's demand for magazine paper in 1986 is expected to increase by 2.1% over 1985 figures, according to the annual survey just recently released by the Magazine Publishers Assn. The 98 publishers that responded to the survey are among the principal forces in the magazine industry.

This increase brings the estimated consumption figure for this year to 1.62 million tons. For 1987, a heftier increase of 3.7% was forecast, which would boost consumption for that year to 1.68 million tons.

In many respects, the results of this year's survey parallel those of last year. Because of the uncertainty in the strength of the economy for the

Projected paper consumption by U.S. magazine publishers (000 tons).

	1985 actual	1986 projected	% change vs 1985
Coated groundwood	1,122	1,165	3.8
Coated free-sheet	172	164	−4.5
Uncoated groundwood	218	215	−1.3
Uncoated free-sheet	24	24	0.3
Imports	55	56	2.3
Total	**1,591**	**1,624**	**2.1**

Source: Magazine Publishers Assn.

short term, publishers in both surveys predicted more modest gains for the current years, saving more optimistic predictions for later on.

The actual 1985 usage figure of 1.59 million tons fell short of the 1.61 million tons that were estimated for 1985 in last year's survey, and the current 1986 estimate has now been revised downward from the 1.68 million tons originally forecast.

The same trend is apparent in the figures for coated groundwood paper consumption. While coated groundwood is by far the predominant grade used by magazine publishers, here also actual 1985 usage fell short of that predicted in 1985's survey.

Currently, a coated groundwood paper increase to 1.16 million tons is projected for 1986, whereas last year the 1986 projection was 1.22 million tons. This year's projection for 1987 is for a 4.3% increase over the current 1986 figure to 1.22 million tons. The actual amount used in 1985 was 1.12 million tons.

The use of imported paper has steadily declined over the last several years, accounting for 3.5% of the total paper usage in 1985. This is not expected to change for 1986 and is to drop to 3.4% in 1987. It was reported that 16% of those surveyed used imported paper in 1985, 13% plan use in 1986, and 12% in 1987.

While only a small shift in basis weight is expected for 1985-87, these breakdowns are a bit changed from those reported in 1980. There has been a drop from 52.9% in 1980 to 47.1% in 1985 for paper in the 32- to 36-lb range. Paper 38 to 50 lb rose from 37% in 1980 to 41.2% in 1985, while 10.1% of paper was 60 lb or more in 1980, compared with 11.7% in 1985.

In terms of the tonnage allocated to the different printing processes, the majority of printing will be done on offset presses (74% of the total), while gravure printing will account for around 27%.

It remains to be seen how closely these usage estimates match what will actually happen for the remainder of this year. A paper industry executive contacted recently said that shipments to magazine publishers of coated No. 5 grades were down 11.8% during the first four months of this year. If the sluggish advertising climate so far continues, publishers may find their paper consumption needs are less than anticipated. ■

CANADIAN CAPACITY

Printing/writing paper capacity surges

Canada's capacity for printing/writing paper is expected to increase by 31%, or 700,000 metric tons, during 1985-88, reflecting increased emphasis on higher value added grades. But the Canadian Pulp & Paper Assn.'s annual capacity survey shows slim growth for bleached kraft market pulp and newsprint—Canada's No. 1 and 2 export grades. In releasing the survey, Howard Hart, president of the CPPA, noted that the industry is pulling out of a period of poor earnings that "simply did not encourage increases in manufacturing capacity."

Total pulp capacity is projected to be 24.9 million tons by 1988—a 4.3% increase over 1985. This reflects an annual growth rate of 1.4%, up from 0.6% for the 1975-85 period. Market pulp capacity is expected to increase by 172,000 tons in 1985-88, a 2.2% rise, indicating an annual growth rate of 0.73%. Canada's market pulp capacity accounts for one third of its total pulp capacity and is to reach 7.9 million tons by 1988.

By 1988, Canada's paper and board capacity will increase to 17.6 million tons, or 7% over last year's level. Newsprint capacity will increase by 380,000 tons—an increase of 3.8% compared with a 9% increase during 1980-83. Capacity for containerboard and boxboard is expected to grow 3% due to minor upgrades. Kraft papers, sanitary papers, and specialty papers will grow between 1% and 2%.

The Atlantic provinces will reap the benefits of 16.9% of the paper and board capacity expansions, followed by Quebec with 8%, and the prairie region with 6.1%. Quebec will gain 9% of the new pulp capacity, far exceeding pulp capacity additions in the other provinces.

Canadian industry annual capacity growth, 1985-88 (000 metric tons).

Market pulp	**1985**	**1986**	**1987**	**1988**
Sulfite paper grades	305	308	310	310
Sulfate paper grades	6,624	6,716	6,756	6,753
Bleached softwood	5,233	5,327	5,387	5,398
Semibleached softwood	420	443	430	428
Bleached hardwood	794	773	770	757
Unbleached	177	173	169	170
Total chemical paper grades	**6,929**	**7,024**	**7,066**	**7,063**
Dissolving and special alpha	266	266	266	266
Mechanical	574	587	604	612
Total market pulp capacity	**7,769**	**7,877**	**7,936**	**7,941**
Increase from previous year	99 1.3%	108 1.4%	59 0.7%	5 0.1%
Paper and board				
Newsprint	9,820	10,040	10,080	10,200
Groundwood printing	1,040	1,160	1,285	1,335
Book, writing, misc.	1,213	1,280	1,440	1,618
Kraft papers	541	547	548	546
Sanitary papers	462	468	468	471
Special papers	40	41	41	41
Containerboard	1,869	1,894	1,916	1,930
Boxboard	798	806	819	823
Total	**15,783**	**16,236**	**16,597**	**16,964**
Building, other	649	650	651	651
Total paper, board capacity	**16,432**	**16,886**	**17,248**	**17,615**
Change from previous year	140 0.9%	454 2.8%	362 2.1%	367 2.1%

Source: Canadian Pulp & Paper Assn.

Printing/writing paper. Most of the capacity additions in groundwood printing and specialty papers will come from conversions of newsprint machines, including those at Abitibi-Price Inc.'s mills in Alma and Kenogami, Que., and MacMillan Bloedel Ltd.'s Powell River, B.C., mill. A new coated groundwood machine at Miramichi Pulp & Paper Inc.'s mill in Newcastle, N.B., and a new uncoated free-sheet machine at Domtar Inc.'s mill in Windsor, Que., along with a new coater at Kruger Inc.'s Trois Rivières, Que., mill, will increase capacity of book and writing paper by approximately 405,000 tons by 1988—a capacity increase of 33%.

These figures exclude Makin Pulp & Paper Ltd.'s proposed 150,000-tpy coated groundwood mill in Britannia Beach, B.C. Nor do they include Weyerhaeuser Canada Ltd.'s 180,000-tpy uncoated free-sheet machine that is slated to start up at Prince Albert, Sask., in 1989 or the 200,000-tpy supercalendered paper mill on the Matane Peninsula of Quebec that is being studied by Saugbrugsforeningen of Norway and Rexfor Ltd.

Newsprint. Three companies are planning to make the addition of one new newsprint machine to their Quebec mills: James Maclaren Industries Inc.'s mill in Masson, CIP Inc.'s mill in Gatineau, and Donohue Inc.'s mill in Clermont. Newsprint capacity will only exhibit a growth rate of 3.8%, however, because of the conversions and idling of some older machines.

Market pulp. Canada is the largest producer in the world of paper-grade chemical market pulp, and approximately 90% of the country's production is being exported. British Columbia accounts for about half of the country's market pulp capacity. Most of the pulp produced in that province is bleached softwood sulfate.

Capacity for dissolving and unbleached sulfite market pulps is expected to remain unchanged. Sulfate capacity will increase by 1.9%, or 129,000 tons over the period. Still, the growth rate for sulfate capacity sold on the market will decline by 0.3% compared with 1975-85. British Columbia will account for 90% of the 173,000 tons of bleached and semibleached softwood pulp capacity expected to come onstream. Hardwood sulfate and unbleached sulfate will fare less well. CPPA expects capacity for these grades to decline by 37,000 tons and 7,000 tons, respectively.

Capacity for market mechanical pulp is expected to increase by 38,000 tons by 1988, or 6.6%. The CPPA expects the recent start up of Tembec Inc.'s mill in Temiscaming, Que., to make up for the tonnage lost when Miramichi Pulp & Paper integrated its Newscastle, N.B., mill. CPPA projections do not include the new 177,500-tpy bleached CTMP mill that has been proposed for Alberta by Millar Western Industries Ltd. or the market CTMP mill being studied by Fibreco Export Inc. in British Columbia. ■

LABOR

Workers strike Weyco sawmills and five pulp mills

Striking sawmill workers shut down five Weyerhaeuser Co. pulp mills in Oregon and Washington for two days last month but voluntarily stopped picketing the pulp mills.

The mills are in Everett, Longview and Cosmopolis, Wash., and Springfield and North Bend, Ore. The 2,000 employees at the five mills decided to stay off the job for two days. The workers are members of the Assn. of Western Pulp & Paper Workers; their contract includes a no-strike clause.

More than 7,300 Weyco lumber and logging workers voted to remain on strike in Oregon and Washington. They rejected a contract that included a 25% cut in pay and benefits. The company has not said what its next move will be, but noted that hiring replacements "is one of our options."

The 2,700 workers at Champion International Corp. also voted down their company's "final offer. A Champion spokesman said the company was "disappointed" that union members rejected an offer that their leaders had recommended.

Weyco said the rejected contract was its "last and best hope" of settling the strike, which started in mid-June and affected company mills and logging operations in the Northwest. Two unions, the Lumber, Production & Industrial Workers and the International Woodworkers of America, represent the employees and have been bargaining together.

Union workers at two other Northwest lumber producers, Boise Cascade Corp. and Willamette Industries Inc., are also voting on proposed contracts. About 6,000 employees are affected. Like Champion and Weyerhaeuser, these companies reportedly want to cut wages and benefits.

The strike cuts Weyerhaeuser's lumber capacity by about half, and may lead to upward pressure on chip prices in the Northwest. So far lumber prices have not responded to the strike. North America's large sawmill overcapacity plus Weyco's shipments from inventory have kept markets supplied. ■

UPIU, IBEW conclude talks at Mead's Escanaba, Mich., mill

Members of the United Paperworkers International Union along with members of the International Brotherhood of Electrical Workers concluded negotiations at Mead Corp.'s 1,314-tpd Escanaba, Mich., printing papers mill. The new three-year pact gives workers a $1,200 lump sum payment in the first year and 3% increases in each of the next two years. Also included is a provision that gives the company greater operating flexibility. The contract expires May 31, 1989. ■

LABOR BRIEFS

■ UPIU sources said that **Hammermill Paper Co.**'s 550-tpd uncoated free-sheet mill located in Erie, Pa., had reached a new four-year agreement calling for a $750 lump sum payment in the first and third years, a 2% increase in the second year, and a 30¢/hour increase in the final year. The contract expires June 9, 1990.

■ **Sonoco Products Co.** concluded talks with members of the UPIU at its 230-tpd recycled board mill in Holyoke, Mass. The new three-year pact, which expires June 26, 1989, calls for a $1,000 payment in the first year and 3% rises in each of the next two years, with a dental plan in the second year.

■ UPIU members ratified a new contract at **Scott Paper Co.**'s S.D. Warren Co. division's 400-tpd fine papers mill in Muskegon, Mich. The agreement, which runs from June 16, 1986, to June 15, 1988, calls for wage increases of 3% each year.

■ UPIU workers approved a new three-year contract with **Procter & Gamble Paper Products Co.** at the company's two tissue mills at Green Bay, Wis. The contract calls for a $500 signing bonus and a 4% lump sum payment in the first year and wage increases of 3.5% in each of the next two years, expiring Apr. 31, 1989. ■

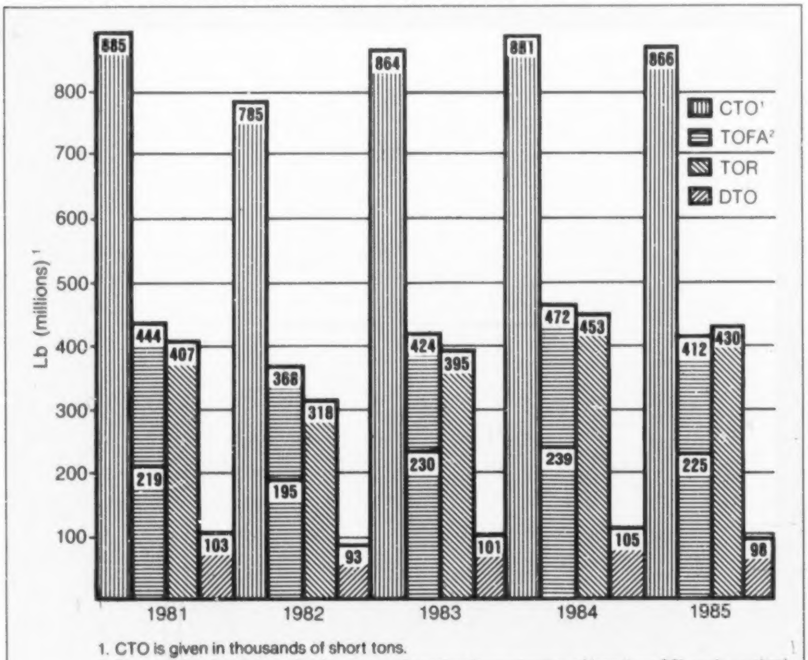
Crude tall oil: turnaround in supply; price could fall to record low

Production. Tight supply of crude tall oil (CTO) persisted in 1985 as production fell nearly 2%, but at the close of second-quarter 1986, the situation may be reversing. Evidence of the turning point in demand includes inventory shifts as tall oil fatty acids (TOFA) stocks soar and tall oil rosin (TOR) stocks decline. TOFA fractions (both above and below 2% rosin content) produced totaled 206,000 short tons, a 10% drop from 1985. Softness in the end user markets and competition from other raw materials such as soya protein have put pressure on CTO fractionators. TOR production also fell 5% to 215,000 short tons. TOR markets are steady, as demand for fractionated products such as paper size and printing ink resins continue to show strength.

This business climate is reflected in the current bright market pulp picture, where production is holding up. *PULP & PAPER WEEK* reports that many Canadian and U.S. sulfate mills will not shut down during the summer, indicating an oversupply of CTO for the rest of the year. A factor to watch is pulp price. High inventories and weak demand could cause pulp prices to fall and force mills to take downtime in early autumn, perhaps easing CTO supply. The other major fraction, distilled tall oil (DTO), also fell in production by 7% to 49,000 short tons.

Six companies with combined CTO fractionating capacity of 1.75 billion lb operate in the U.S. At press time, Sylvachem (a division of SCM) had sold two facilities (the Port St. Joes fractionating complex and a small Mississippi processing plant) and its product line to International Paper Co. IP will integrate its value-added products through Arizona Chemicals, its wholly owned subsidiary, making IP the world's largest fractionator in terms of capacity. Outside the U.S., there are at least 21 CTO fractionators in 17 countries with capacity of 1.34 billion lb. The U.S. exports about 7% of its output. Inroads made by raw materials like vegetable oil- and tallow-based fatty acids are already established in the market and will continue to be price competitive.

FIGURE 1: **Production and distribution of crude tall oil fractions.**



1. CTO is given in thousands of short tons.
2. First number is total production; second number is production of less than 2% rosin content.

Factors curbing CTO production over the long term are many. Hardwood use is climbing, and softwood use is falling. Over the past ten years, the American Pulpwood Assn. estimates a 3% drop in softwood consumption in the South. Recycled fiber is also being utilized in greater proportions—even in high-strength papers such as kraft linerboard. As for new pulping lines, the trend is toward mechanical methods that yield little byproduct but raise fiber yield. CTO is also a potential fuel source, and its energy value usually dictates its use as fuel or as a saleable product. Due to the fluctuating energy situation, the fuel value of CTO is dropping as well, making it less likely to be consumed for energy and more likely to be sold at the best price.

New harvesting techniques that help to keep roundwood storage time down and innovative recovery ideas may offset some of these long-term losses. Other suggestions for higher yields include improved process control, skimming efficiency, and new systems, such as air injection, chemical addition (to stimulate soap flocculation), and electroflocculation.

Price. 1985's near-record CTO price levels have been somewhat maintained through second-quarter 1986. As recovery rates jump (perhaps by 15%) and pulp mills maintain high operating rates while CTO fractionators do not, the price may tumble below $130/ton f.o.b. for the first time in recent history. Fractionators commented that this is the level that they must achieve to regain markets lost in the past year. CTO prices climbed 75% from 1984 to 1985, while TOFA products achieved penny-per-pound increases throughout the same period, only to have them fall at the beginning of 1986. The opposite is true of TOR products. As a result, profit margins for fractionators are being squeezed, inventories are unbalanced, and market instability persists.

A report published by Hochberg & Co. of Chester, N.J., states that demand for fractionated CTO by 1994 will total 2.7 billion lb, while capacity reaches the 2.1-billion-lb level. Use for TOFA and TOR is projected to grow 2.5% annually for the next ten years, despite the cyclic nature of this commodity-based industry. ■

MORE PAPER, BUT PRICES AND PROFITS DECLINED LAST YEAR; '86 LOOKS GOOD

People's Rep. China took the lead in output growth; fluctuating value of the U.S. dollar made 1985 a difficult year, but 1986 holds promise

By PETER SUTTON, JOHN PEARSON,
HUGH O'BRIAN, International Editors

Oversupply, weak pricing, and poor profits characterized 1985. Paper and board production declined in the world's largest market, North America, as well as in the European Economic Commmunity. It was left to Asia, helped marginally by the other major regions, to provide the final worldwide increase in output: 193 million metric tons, up 1.8% from 1984. Apparent consumption rose similarly. by 1.5% to 192 million tons.

World pulp output reached 140 million tons, up just 0.2%. Again, production fell in North America and the EEC. Total output from Scandinavia also dropped.

Oversupply of major pulp and paper commodity grades in the last quarter of 1984 was carried over into early 1985, and downtime to correct overcapacity was needed by the end of the year and into early 1986. The U.S. economy, which provided the impetus for the record year of 1984, showed a marked slowdown. Other economies followed, reducing the level of business.

In international trade, currency instability, which had so much dominated the end of 1984, continued to be a crucial factor in 1985. Early in the year, the dollar reached an all-time high against leading currencies. By the end of 1985, it had fallen by 30%. The effect was a staunching of U.S. and Canadian exports for the first half of the year, followed by a scramble to recover market share as the dollar fell. In Europe, sales moved out of dollars and into local currency prices. Overall, the dollar contributed to the weak prices that blighted the performance of much of the industry in 1985.

Of total world paper and board output, one ton in five was traded. The sum of all the reports that came in for *Pulp & Paper International*'s annual review shows imports (40.4 million tons) almost in balance with exports (41.3 million tons)—both were very close to 1984 levels. Pulp imports and exports balanced at 22 million tons.

Moving into 1986, the currency markets seemed to be more stable. This, combined with a general strengthening of demand and concerted downtime to avoid overca-

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All figures in this review are in metric tons.

World's top 20 producing and consuming countries

PAPER AND BOARD PRODUCTION
(000 metric tons)

	1985	% change 1985/84
1. U.S.	61,121	−1.8
2. Japan	20,469	+5.8
3. Canada	14,448	+1.2
4. U.S.S.R.	9,950	+3.4
5. Fed. Rep. Germany	9,178	+0.4
6. People's Rep. China	9,112	+20.5
7. Finland	7,444	+1.7
8. Sweden	7,003	+2.0
9. France	5,343	−4.0
10. Italy	4,587	−2.7
11. Brazil	4,054	+7.1
12. U.K.	3,766	+3.6
13. Spain	2,913	−1.3
14. Mexico	2,448	+9.3
15. Rep. Korea	2,311	+4.7
16. Taiwan	2,018	+4.6
17. Austria	1,922	+7.4
18. Netherlands	1,904	+1.0
19. Norway	1,624	+4.0
20. Australia	1,543	−0.8

PULP PRODUCTION
(000 metric tons)

	1985	% change 1985/84
1. U.S.	49,144	−2.3
2. Canada	20,419	+0.4
3. Japan	9,279	+1.7
4. Sweden	9,123	−1.8
5. U.S.S.R.	8,320	+1.9
6. Finland	7,976	−0.7
7. People's Rep. China	6,365	+18.9
8. Brazil	3,722	−5.9
9. Fed. Rep. Germany	2,107	−0.9
10. Norway	1,978	+6.1
11. France	1,946	−5.2
12. Spain	1,439	+0.3
13. Portugal	1,388	+20.2
14. Austria	1,321	+7.5
15. New Zealand	1,145	+7.8
16. Czechoslovakia	1,116	+6.1
17. India	1,050	—
18. South Africa	1,030	+3.0
19. Australia	887	+6.6
20. Poland	878	−1.1

PER CAPITA CONSUMPTION
(lb/year)

	1985	% change 1985/84
1. U.S.	626	−1.1
2. Sweden	518	+5.9
3. Canada	445	+1.0
4. Finland	417	+5.0
5. New Zealand	401	+38.0
6. Denmark	397	−2.2
7. Switzerland	395	+2.9
8. Fed. Rep. Germany	384	−1.1
9. Netherlands	377	—
10. Japan	370	−0.6
11. Belgium	370	+4.4
12. Luxemburg	362	+3.1
13. Hong Kong	357	+24.6
14. Australia	313	—
15. U.K.	306	+3.7
16. Norway	302	−6.2
17. Austria	287	+8.3
18. France	262	−5.6
19. Singapore	256	−6.4
20. Iceland	238	+14.9

REVIEW OF TOP 20 NATIONS IN PULP/PAPER PRODUCTION

Australia

Population: 15,749,000. Per capita consumption of paper and board: 142 kg/313 lb. Paper and board mills: 17. Pulp mills: 18 (sulfate: 2; sulfite: 1; semichemical: 4; mechanical: 8; nonwood: 1).

Paper/board capacity: 1,675,000 tons **Pulp capacity:** 1,158,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1984	1985	1984	1985	1984	1985
Newsprint and other printing paper	601	619	—	—	—	—
Other paper and board	954	924	—	—	—	—
Total	**1,555**	**1,543**	**722**	**770**	**74**	**75**
Total pulp	**832**	**887**	**216**	**185**	**3**	**19**

Austria

Population: 7,557,500. Per capita consumption of paper and board: 130 kg/287 lb. Paper and board mills: 36. Pulp mills: 16 (sulfate: 3; sulfite: 7; semichemical: 1; mechanical: 6).

Paper/board capacity: 2,445,000 tons **Pulp capacity:** 1,518,000 tons
Operating rate 1985: 87% **Operating rate 1985:** 87%

(000 metric tons)

	Production		Imports		Exports	
	1984	1985	1984	1985	1984	1985
Paper	1,595	1,787	277	279	1,055	1,203
Board	327	340	25	24	231	245
Total	**1,922**	**2,127**	**302**	**303**	**1,286**	**1,448**
Chemical woodpulp	923	999	222	275	242	277
Other pulps	306	322	29	40	5	0
Total	**1,229**	**1,321**	**251**	**315**	**247**	**277**

Brazil

Population: 134,000,000. Per capita consumption of paper and board: 27 kg/60 lb. Paper and board mills: 45e. Pulp mills: 14 (sulfate: 9; sulfite: 1; mechanical: 1; nonwood, 1).

Paper/board capacity: 4,200,000 tons **Pulp capacity:** 4,000,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1984	1985	1984	1985	1984	1985
Paper	3,368	3,614	180	119	596	484
Board	397	440	—	2	63	59
Total	**3,765**	**4,054**	**180**	**121**	**659**	**543**
Chemical woodpulp	3,567	3,331	14	37	960	926
Other pulps	390e	391	—	—	—	8
Total	**3,957e**	**3,722**	**14**	**37**	**960**	**934**

Canada

Population: 25,100,000. Per capita consumption of paper and board: 200 kg/441 lb. Paper and board mills: 108. Pulp mills: 34.*

Paper/board capacity: 15,783,000 tons **Pulp capacity:** 23,903,000 tons
Operating rate 1985: 92% **Operating rate 1985:** 88%

(000 metric tons)

	Production		Imports		Exports	
	1984	1985	1984	1985	1984	1985
Paper	13,481	13,751	382	373	9,673	9,851
Board	745	697	166	176	76	61
Total	**14,226**	**14,448**	**548**	**579**	**9,749**	**9,912**
Chemical woodpulp	11,417	11,456	136	167	6,112	6,502
Other pulps	8,921	8,963	58	56	749	667
Total	**20,338**	**20,413**	**194**	**223**	**6,861**	**7,169**

*Market pulp only.

China, People's Rep. of

Population: 1,046,390,000. Per capita consumption of paper and board: 9 kg (e)/20 lb. Paper and board mills: 1,600e.

Paper/board capacity: 8,867,000 tons **Pulp capacity:** 7,204,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1984	1985	1984	1985	1984	1985
Paper	2,357	2,706	73	319	95	95
Packaging paper/board	3,090	4,001	494	378	111	113
Other paper/board	2,113	2,405	115	111	26	19
Total	**7,560**	**9,112**	**682**	**808**	**232**	**227**
Chemical woodpulp	832	938	544	454	—	—
Mechanical pulp	373	403	31	16	—	—
Reed, bamboo, other pulps	4,147	5,024	44	60	—	—
Total	**5,352**	**6,365**	**619**	**530**	**4**	**1**

Finland

Population: 4,902,000. Per capita consumption of paper and board: 189 kg/417 lb. Paper and board mills: 46. Pulp mills: 46 (sulfate: 18; semichemical: 3; mechanical: 22).

Paper/board capacity: 8,085,000 tons **Pulp capacity:** 8,990,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1984	1985	1984	1985	1984	1985
Paper	6,355	6,476	45	51	5,204	5,411
Board	963	968	16	20	774	756
Total	**7,318**	**7,444**	**61**	**71**	**5,978**	**6,167**
Chemical woodpulp	4,770	4,808	23	15	1,309	1,304
Other pulps	3,261	3,168	26	47	252	230
Total	**8,031**	**7,976**	**49**	**62**	**1,561**	**1,534**

France

Population: 55,300,000. Per capita consumption of paper and board: 119 kg/262 lb. Paper and board mills: 155. Pulp mills: 24 (sulfate: 7; sulfite: 3; semichemical: 5; mechanical: 9).

Paper/board capacity: 5,500,000 tons **Pulp capacity:** 2,300,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1984	1985	1984	1985	1984	1985
Paper	5,014	4,823	2,053	1,992	1,181	1,162
Board	552	520	529	530	138	147
Total	**5,566**	**5,343**	**2,582**	**2,522**	**1,319**	**1,309**
Chemical woodpulp	1,575	1,498	1,517	1,471	243	303
Other pulps	477	448	108	112	5	8
Total	**2,052**	**1,946**	**1,625**	**1,583**	**248**	**311**

Germany, Fed. Rep.

Population: 61,015,000. Per capita consumption of paper and board: 174 kg/384 lb. Paper and board mills: 189. Pulp mills: 37; (sulfite: 10; semichemical: 1; mechanical: 26).

Paper/board capacity: 10,242,000 tons **Pulp capacity:** 2,312,000 tons
Operating rate 1985: 90% **Operating rate 1985:** 95%

(000 metric tons)

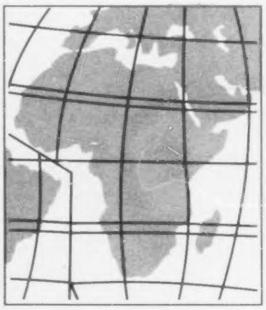
	Production		Imports		Exports	
	1984	1985	1984	1985	1984	1985
Paper	8,052	8,246	4,066	3,947	2,298	2,315
Board	1,093	932	363	386	504	571
Total	**9,145**	**9,178**	**4,429**	**4,333**	**2,802**	**2,886**
Chemical woodpulp	823	818	2,720	2,855	135	116
Other pulps	1,304	1,289	72	74	—	—
Total	**2,127**	**2,107**	**2,792**	**2,929**	**135**	**116**

pacity, should make for a more profitable 1986.

The most noticeable result from 1985 was a 20.5% growth in output in People's Rep. China, which made almost the same amount of paper and board in 1985 as Fed. Rep. Germany. China also recorded a 19% growth in pulp production and a 21% growth in consumption. With Japan, the region's top producer, increasing output by 5.8% to over 20 million tons, Asia led the world in percentage growth.

EFFECTS OF NEW CAPACITY. At the start of the year, the effects of new capacity in pulp and some paper sectors was already evident. The pulp market suffered from overcapacity and insufficient downtime to adequately reduce stocks. The high value of the dollar caused further weakness in most markets. It was not until the end of the year that producers took sufficient downtime to correct the situation.

Paper grades suffered as well. Newsprint prices were depressed in Europe and the U.S. and reached rock bottom in the Far East. In printing grades, a decline in U.S. consumption meant that offshore capacity dedicated to the U.S. market had to be absorbed by other parts of the world. Kraft liner markets remained soft throughout the year, with a slowing world economy and overproduction again revealed as the roots of the problem. There have been many price rises in paper and board grades around the world, and most of *P&P*'s editors and correspondents are optimistic about the latter half of 1986.



AFRICA

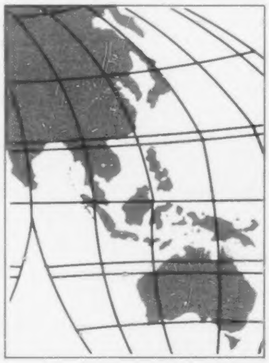
PRODUCTION OF PAPER and board in Africa rose by 7% in 1985 to nearly 2.2 million tons. Pulp output also went up slightly, by an estimated 30,000 tons to 1.5 million tons. Most of the increase was attributable to the expansions completed in late 1984 in Africa's largest producer, South Africa.

The expansion projects, Mondi Paper Co. Ltd.'s 420,000-tpy Richards Bay greenfield pulp and kraft liner mill and Sappi Ltd.'s 440,000-tpy Ngodwana market pulp, kraft liner, and newsprint mill, are now through their startup phases and are earning money in exports.

However, 1985 and the first half of 1986 have seen many problems develop for the South African industry, and these are of a political rather than technical or industrial nature. International reaction to domestic government policies is leading to increasing pressure for trade restrictions against South Africa. Last year, the country exported 420,000 tons of paper and board and about 430,000 tons of pulp, a volume large enough to be significant if international action is concerted. On the side of the exporters is the low international value of the rand against the dollar and other major currencies and the proximity to the fast-growing Asian market. Against them are high interest rates imposed to protect the currency, which have raised the cost of borrowing.

Elsewhere in the continent, output was hit by low reserves of foreign exchange, which made it difficult and sometimes impossible to buy raw materials for papermaking. Servicing loans to international banks has not eased the problem. This illustrated by Nigeria, where a serious drop in oil revenues has led to a scarcity of funds for importing raw materials like pulp. Of the country's three paper mill projects, two have now started up and are enjoying uneven success. Nigerian Paper Mill Ltd. maintained an operating rate of about 60% in 1985, while Nigerian Newsprint Manufacturing started up production based on CTMP in late 1985.

Some bright spots exist. Zimbabwe is considering a new pulp mill based on local wood resources. A study has been completed, and a final decision will be made soon. There is also interest in building a CTMP line in the Congo. It would use local eucalyptus, and the output would be exported to Europe's papermakers.



ASIA/ AUSTRALASIA

OUTPUT OF PAPER and board in Asia in 1985 amounted to 37.5 million tons, up a sharp 7% from 1984. The big four producing nations (Japan, People's Rep. China, Rep. of Korea, and Taiwan) all recorded rises, with People's Rep. China's leap of more than 20% adding 1.5 million tons to Asia's output. Asian pulp output increased 4.3% compared with 1984, to 18.5 million tons. Again, People's Rep. China's production grew by 1 million tons, accounting for most of the increase.

Although the Chinese industry is expanding rapidly, Japan remains the leader of the Asian paper industry and is second only to the U.S. in total output. Paper and board production in Japan rose 5.8% in 1985 to 20.5 million tons—the first time output exceeded the 20-million-ton mark. Casemaking material production was up 14% to 5.8 million tons, with kraft liner rising 17% to 1.6 million tons.

Earlier this year, Japan's Ministry of International Trade & Industry scrapped its capacity-cutting program,

TOP 20 PRODUCING NATIONS *(Continued)*

Italy

Population: 57,115,000. Per capita consumption of paper and board: 91 kg/ 201 lb. Paper and board mills: 360. Pulp mills: 25; sulfite: 2; semichemical: 4; mechanical: 15; nonwood: 4).

Paper/board capacity: 5,200,000 tons **Pulp capacity:** 950,000 tons
Operating rate 1985: 88% **Operating rate 1985:** 75%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	3,757	3,691	1,420	1,461	840	817
Board	957	896	182	155	188	175
Total	**4,714**	**4,587**	**1,602**	**1,616**	**1,028**	**992**
Chemical woodpulp	214	147	1,511	1,645	57	59
Other pulps	599	569	122	124	6	4
Total	**813**	**716**	**1,633**	**1,769**	**63**	**63**

Japan

Population: 121,047,000. Per capita consumption of paper and board: 167 kg/ 368 lb. Paper and board mills: 489. Pulp mills: 65 (sulfate: 38; sulfite: 4; semichemical: 7; mechanical: 25; nonwood: 4).

Paper/board capacity: 24,043,000 tons **Pulp capacity:** 12,471,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	16,540	17,619	650	665	602	608
Board	2,805	2,850	48	38	241	261
Total	**19,345**	**20,469**	**698**	**703**	**843**	**869**
Chemical woodpulp	7,063	7,158	1,509	1,630	30	15
Other pulps	2,064	2,121	655	638	9	5
Total	**9,127**	**9,279**	**2,164**	**2,268**	**39**	**20**

Korea, Rep. of

Population: 41,209,000. Per capita consumption of paper and board: 55 kg/ 121 lb. Paper and board mills: 150e. Pulp mills: 5 (sulfate: 1; mechanical: 4).

Paper/board capacity: 2,780,000 tons **Pulp capacity:** 426,000 tons
Operating rate 1985: 83% **Operating rate 1985:** 63%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	1,820	1,899	60	87	42	56
Board	387	412	2	2	33	54
Total	**2,207**	**2,311**	**62**	**89**	**75**	**110**
Chemical woodpulp	121	129	519	631	0	0
Other pulps	137	138	72	49	0	0
Total	**258**	**267**	**591**	**680**	**0**	**0**

Mexico

Population: 79,000,000. Per capita consumption of paper and board: 32 g/71 lb. Paper and board mills: 66. Pulp mills: 17 (sulfate: 9; sulfite: 1; mechanical: 1; nonwood: 7).

Paper/board capacity: 3,313,000 tons **Pulp capacity:** 1,034,000 tons
Operating rate 1985: 74% **Operating rate 1985:** 78%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	1,997	2,189	67	97	48	39
Board	243	259	6	8	—	—
Total	**2,240**	**2,448**	**73**	**105**	**48**	**39**
Chemical woodpulp	438	462	211	271	—	—
Other pulps	363	358	16	40	—	—
Total	**801**	**820**	**227**	**311**	**—**	**—**

Netherlands

Population: 14,484,000. Per capita consumption of paper and board: 171 kg/ 169 lb. Paper and board mills: 33. Pulp mills: 3 (mechanical: 2; nonwood: 1).

Paper/board capacity: 2,111,000 tons **Pulp capacity:** 158,000 tons
Operating rate 1985: 90% **Operating rate 1985:** 87%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	1,299	1,297	1,423	1,427	758	804
Board	586	607	256	286	338	336
Total	**1,885**	**1,904**	**1,679**	**1,713**	**1,096**	**1,140**
Chemical woodpulp	0	0	535	525	7	21
Other pulps	154	138	35	30	0	0
Total	**154**	**138**	**570**	**555**	**7**	**21**

Norway

Population: 4,100,000. Per capita consumption of paper and board: 137 kg/ 302 lb. Paper and board mills: 23. Pulp mills: 27 (sulfate: 2; sulfite: 4; semichemical: 2; mechanical: 19).

Paper/board capacity: 1,835,000 tons **Pulp capacity:** *2,115,000 tons
Operating rate 1985: 88% **Operating rate 1985:** 87%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	1,529	1,570	211	219	1,193	1,264
Board	33	34	17	20	17	16
Total	**1,562**	**1,604**	**228**	**239**	**1,210**	**1,280**
Chemical woodpulp	656	653	114	105	255	234
Other pulps	1,208	1,325	6	7	304	322
Total	**1,864**	**1,978**	**120**	**112**	**559**	**556**

*Excludes dissolving pulp.

Spain

Population: 38,700,000. Per capita consumption of paper and board: 76 kg/ 168 lb. Paper and board mills: 177. Pulp mills: 27 (sulfate: 24; sulfite: 1; mechanical: 6; nonwood: 6).

Paper/board capacity: 3,186,000 tons **Pulp capacity:** 1,540,300 tons
Operating rate 1985: 91% **Operating rate 1985:** 93%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	2,625	2,600	422	430	308	316
Board	325	313	26	29	104	113
Total	**2,950**	**2,913**	**448**	**459**	**412**	**429**
Chemical woodpulp	1,184	1,221	288	316	278	332
Other pulps	251	218	7	14	23	5
Total	**1,435**	**1,439**	**295**	**330**	**301**	**337**

Sweden

Population: 8,350,000. Per capita consumption of paper and board: 222 kg/ 489 lb. Paper and board mills: 56. Pulp mills: 56 (sulfate: 25; sulfite: 8; semichemical: 2; mechanical: 21).

Paper/board capacity: 7,575,000 tons **Pulp capacity:** 9,910,000 tons
Operating rate 1985: 92% **Operating rate 1985:** 92%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	5,702	5,799	171	180	4,315	4,346
Board	1,167	1,204	50	44	878	919
Total	**6,869**	**7,003**	**221**	**224**	**5,193**	**5,265**
Chemical woodpulp	7,029	6,781	128	140	2,791	2,547
Other pulps	2,264	2,342	11	6	420	450
Total	**9,293**	**9,123**	**139**	**146**	**3,211**	**2,997**

which had been in effect since 1983. A number of new expansions are now considered likely. For 1986, the strength of the yen is expected to have a negative effect on Japan's economy, which has been slowing down since mid-1985.

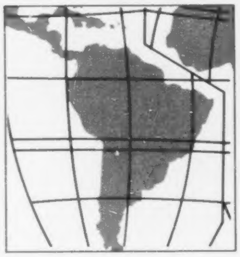
With 1985 production of 9.1 million tons, People's Rep. China ties Fed. Rep. Germany as the world's fifth largest paper and board maker. Output has risen 38% in the last two years, and all indications are that such growth will continue. By the turn of the century, capacity is projected to be around 20 million tpy. Several new and used paper machines are presently being installed in China. At Jilin Paper, in northeastern China, a 60,000-tpy newsprint machine is being installed. The unit is a secondhand paper machine from Sweden.

Late in 1985, People's Rep. China made its first investment in a foreign manufacturing operation with the purchase of the former Morris Paperboard Co. mill in Paterson, N.J. Originally, plans called for much of the tonnage to be shipped to China, but it now appears that production will be sold in the U.S. Chinese mills have also recently begun installing process control equipment on paper machines and in pulp mills. At least six mills have ordered basis weight profile controlling units. Additionally, three pulp mills have added brightness monitoring systems.

Paper and board production in both Rep. Korea and Taiwan rose by 4.6% in 1985. Taiwan topped 2 million tons for the first time as several new paper machines were completed. Pulp capacity also rose as Taiwan Pulp & Paper Corp.'s 130,000-tpy bleached kraft line came onstream. In Rep. Korea, new paper machine startups led to overcapacity in duplex board and newsprint.

In India, Tamil Nadu's 90,000-tpy newsprint and printing/writing paper mill started up early this year, using both bagasse and hardwood as raw material. Numerous small mills started up, although at least five major ones were shut down by financial losses, raw material shortages, and labor problems.

Total paper and board output in Australia was 2.3 million tons in 1985, no change from 1984. New Zealand's paper industry showed strong profit growth in 1985. Winstone Samsung's pulp mill made its first profit, and Tasman Pulp & Paper Co. Ltd.'s profit was vastly improved to NZ$41.8 million ($28 million). Among the other major producers in the country, Carter Holt and NZ Forest Products improved their profits by 51% and 41%, respectively.



LATIN AMERICA

HIGH INFLATION AND A HIGH debt burden remain the major problems for the governments and business communities of Latin America. In 1985, some countries showed signs of overcoming some of their problems while others encountered new difficulties.

Chile showed a balance of payments surplus of $800 million. Hyperinflation was averted in Argentina, although at a cost of a sharp domestic recession. GNP is expected to jump by 9% in 1986, following new government policies in Brazil. And Mexico is facing severe anti-inflation measures that will affect its economy.

Against this background, the continent's pulp and paper industries have fared best where they are geared up for exports and can avoid low demand or anti-inflationary price controls at home. Overall, pulp and paper production was up by 4.5% in 1985 compared with 1984, reaching nearly 9.2 million tons. Brazil was by far the biggest producer, making 4.1 million tons of all grades—an increase of 7.1% over 1984. Indeed, Brazil's domestic market showed a very healthy, growing demand during 1985. Mexico was the next largest producer, with 2.5 million tons, a 9.3% increase from 1984. It also enjoyed success with newsprint exports to the U.S.

In Brazil, pulp production fell by 200,000 tons from its 1984 level of 6.7 million tons, and market pulp production fell as Champion Papel e Celulose SA and Suzano de Papel e Celulose SA paper mills completed major integration projects. Brazil, however, remained the leading producer, with an output of 3.7 million tons, down 5.9% from 1984. Next was Mexico with 820,000 tons of production. Chile followed with 683,000 tons.

In general, 1985 was a good year for Latin American pulp exporters. Chile was able to establish new markets for its radiata pine kraft pulps in the U.S., Asia, and Africa. Brazil's eucalyptus pulp producers have seen an increasing acceptance of their pulps by papermakers, and during the first half of 1986 they have enjoyed a tight market and good pricing in European markets. Brazilian producers are expected to look increasingly for a share of the U.S. pulp market.

Production by continents, world total (000 metric tons)

PULP

	1960	1970	1980	1984	1985
North America	32,964	54,912	65,969	70,661	69,563
Europe	20,965	34,853	40,235	41,701	41,934
Asia/Australasia	5,156	14,268	18,239	19,329	20,663
Latin America	821	2,224	5,848	6,716	6,514
Africa	124	900	1,502	1,488	1,519
World total	**60,031**	**107,157**	**131,793**	**139,895**	**140,193**

PAPER AND PAPERBOARD

	1960	1970	1980	1984	1985
North America	38,917	58,914	70,225	76,452	75,569
Europe	25,634	45,159	59,023	65,400	65,945
Asia/Australasia	7,861	20,621	31,962	36,973	40,228
Latin America	1,656	3,712	7,737	8,769	9,161
Africa	288	892	1,717	2,034	2,172
World total	**74,355**	**129,298**	**170,664**	**189,628**	**193,075**

WORLD PULP, PAPER, AND BOARD INDUSTRY AT A GLANCE

	Population (1,000)	Number of mills		Capacity (1,000 tons)		Per capita (lb)	Consumption (1,000 tons)				Production (1,000 tons)			
		P & B	Pulp	P & B	Pulp		P & B		Pulp		P & B		Pulp	
							1984	1985	1984	1985	1984	1985	1984	1985
EUROPE														
Belgium	9,858	14	3	920	345	371	1,568	1,660e	631	619e	858	871e	335	321e
Denmark	5,150	6	2	380	115	396	941	926	149	131	352	322	93	88
France	55,300	155	24	5,500	2,300	261	6,809	6,556	3,429	3,218	5,566	5,343	2,052	1,946
Germany, Fed. Rep.	61,015	189	37	10,242	2,312	384	10,772	10,625	4,879	5,016	9,145	9,178	2,127	2,107
Greece	9,700	22	3	430	65	120	497	528	185	163	300	325	45	20
Ireland	3,250	2	0	50	0	189	274	279	10	10	25	26	0	0
Italy	57,115	360	25	5,200	950	201	5,288	5,211	2,383	2,404	4,714	4,587	813	716
Luxemburg	365	0	0	0	0	362	58	60	0	0	0	0	0	0
Netherlands	14,484	33	3	2,111	158	377	2,468	2,477	717	672	1,885	1,904	154	138
United Kingdom	55,950	96	6	3,955	480	307	7,631	7,796	1,820	1,851	3,636	3,766	190	295
EEC	**272,187**	**877**	**103**	**28,788**	**6,725**	**293**	**36,306**	**36,118**	**14,203**	**14,084**	**26,481**	**26,322**	**5,809**	**5,631**
Finland	4,902	46	46	8,085	8,900	417	1,401	1,348	6,519	6,504	7,318	7,444	8,031	7,976
Norway	4,100	23	27	1,835	2,115	303	580	563	1,425	1,534	1,562	1,624	1,864	1,978
Sweden	8,350	56	56	7,575	9,910	518	1,897	1,962	6,221	6,272	6,869	7,003	9,293	9,123
Scandinavia	**17,352**	**125**	**129**	**17,495**	**20,925**	**495**	**3,878**	**3,873**	**14,165**	**14,310**	**15,749**	**16,071**	**19,188**	**19,077**
Austria	7,557	36	16	2,445	1,518	286	938	982	1,233	1,359	1,922	2,127	1,229	1,321
Iceland	241	0	0	0	0	238	22	26	0	0	0	0	0	0
Malta	380	0	0	0	0	52	9	9	0	0	0	0	0	0
Portugal[1]	10,129	95	8	720	1,283	113	510	520	532	426	653	647	1,155	1,388
Spain[1]	38,700	177	27	3,186	1,540	168	2,986	2,943	1,429	1,432	2,950	2,913	1,435	1,439
Switzerland	6,482	29	6	1,055	330	395	1,126	1,161	547	577	986	1,019	302	315
Other W.Europe	**63,489**	**337**	**57**	**7,406**	**4,671**	**196**	**5,591**	**5,641**	**3,741**	**3,794**	**6,511**	**6,706**	**4,121**	**4,413**
Total W.Europe	**353,028**	**1,339**	**289**	**53,689**	**32,321**	**285**	**45,775**	**45,632**	**32,109**	**32,188**	**48,741**	**49,099**	**29,118**	**29,121**
Albania	2,750	4	4	15e	15e	15	19e	19e	10e	10e	10e	10e	10e	10e
Bulgaria	9,000	15	9	450e	260e	120	490e	490e	370e	370e	400e	400e	215e	215e
Czechoslovakia	15,562	49	22	1,370	1,223	181	1,191	1,279	1,037	994	1,263	1,278	1,052	1,116
Germany Dem. Rep.	16,660	21	19	1,500e	750e	182	1,357	1,357	816	820	1,296	1,292	667	678
Hungary	10,600	10	6	550e	150e	138	670	665	301	280	506	494	108	92
Poland	37,345	48	20	1,450	1,000	79	1,268	1,336	1,042	1,025	1,238	1,284	878	868
Romania	23,000	20	12	850e	750e	66	685e	685e	720e	720e	790e	790e	660e	660e
USSR	275,000	84	57	10,750	10,000	74	9,162	9,250e	7,334	7,600e	9,825	9,950e	8,152	8,320e
Yugoslavia	23,123	30	21	1,600	950	115	1,175	1,210	948	865	1,331	1,349	841	854
E. Europe	**413,040**	**281**	**170**	**16,470**	**14,183**	**87**	**16,017**	**16,309**	**12,578**	**12,684**	**16,659**	**16,847**	**12,583**	**12,813**
Total Europe	**766,068**	**1,620**	**459**	**70,159**	**46,504**	**178**	**61,792**	**61,941**	**44,687**	**44,872**	**65,400**	**65,946**	**41,796**	**42,030**
NORTH AMERICA														
Canada	25,100	108	34	15,783	23,903	447	5,025	5,085	13,671	13,473	14,226	14,448	20,338	20,419
United States	239,300	571	225	68,457	53,165	626	68,555	67,966	51,136	49,753	62,226	61,121	50,323	49,144
North America	**264,400**	**679**	**259**	**84,240**	**77,068**	**609**	**73,580**	**73,051**	**64,807**	**63,226**	**76,452**	**75,569**	**70,661**	**69,563**
ASIA														
Afghanistan	16,000	0	0	0	0	0	1e	1e	0	0	0	0	0	0
Bangladesh	100,000	7	8	200	250	2	104	110	200	210	106	115	190	200
Bahrain	400	0	0	0	0	22	4e	4e	0	0	0	0	0	0
Bhutan	1,400	0	0	0	0	2	1e	1e	0	0	0	0	0	0
Brunei	300	0	0	0	0	15	2e	2e	0	0	0	0	0	0
Burma	34,000	4	2	-	-	3	40e	40e	15e	15e	10e	10e	15e	15e
China, Peo. Rep.	1,046,390	1,600	8,867	7,204	6,653	21	8,010	9,693	5,967	6,894	7,560	9,112	5,352	6,365
Cyprus	700	1	0	10	0	183	53e	58e	8e	8e	8e	8e	0	0
Hong Kong	5,200	3	0	40	0	356	785e	840e	5e	5e	35e	40e	0	0
India	700,000	262	-	2,458	1,450	6	1,574	1,740	1,050e	1,150e	1,367	1,590	1050e	1050e
Indonesia	150,000	35	16	877e	300e	10	614e	700e	450e	520e	380e	480e	200e	250e
Iran	40,000	17	2	320e	250e	16	300e	285e	90e	70e	100e	75e	50e	40e
Iraq	13,000	2	2	144e	90e	12	70e	70e	40e	40e	30e	30e	30e	30e
Israel	4,500	5	0	160	0	175	359	358	0	0	154	147	0	0
Japan	121,047	489	65	24,043	12,471	370	19,200	20,303	11,252	11,527	19,345	20,469	9,127	9,279
Jordan	3,500	1	0	18	0	50	75	80	3	3	8	15	0	0
Kampuchea	9,000	0	0	0	0	2	6e	6e	0	0	0	0	0	0
Korea, Peo. Rep.	20,000	6	2	100e	80e	10	90e	90e	50e	50e	80e	80e	50e	50e
Korea, Rep. of	41,209	150	5	2,780	426	123	2,194	2,290	849	947	2,207	2,311	258	267
Kuwait	1,695	1	0	25	0	42	32e	32e	0	0	20e	20e	0	0
Laos	4,000	0	0	0	0	1	1e	1e	0	0	0	0	0	0
Lebanon	3,300	3	0	50e	0	70	110e	105e	5e	5e	45e	45e	0	0
Macao	300	0	0	0	0	73	10e	10e	0	0	0	0	0	0
Malaysia	11,500	13	1	100e	60e	73	375e	382e	45e	52e	68e	73e	40e	45e
Mongolia	1,750	1	1	10e	10e	25	20e	20e	5e	5e	5e	5e	5e	5e
Nepal	16,300	3	2	17	20	1	7	10	7e	10e	2	0	0e	0e
Oman	1,000	0	0	0	0	11	5e	5e	0	0	0	0	0	0
Pakistan	88,000	15	-	160	40	8	248	315	0	0	105	119	110	115e
Philippines	55,000	25	9	549	303	15	399	364	222	134	252	218	180	99
Qatar	300	0	0	0	0	37	5e	5e	0	0	0	0	0	0
Saudi Arabia	9,500	0	0	0	0	23	100e	100e	0	0	0	0	0	0
Singapore	2,500	2	0	20	0	256	300e	290e	11e	15e	10e	10e	0	0
Sri Lanka	15,000	2	2	40e	25e	10	70e	70e	28e	26e	25e	25e	21e	21e
Syria	9,000	3	0	35e	0	20	80e	80e	10e	10e	5e	5e	0	0
Taiwan	19,248	151	3	2,700	500	236	1,982	2,063	461	541	1,929	2,018	325	350
Thailand	50,000	33	5	450e	110e	22	490e	505e	160e	170e	329e	350e	40e	50e
Turkey	48,000	36	17	600e	540e	24	523	520e	432	435e	488	490e	377	380e
United Arab Emirates	1,000	0	0	0	0	13	6e	6e	0	0	0	0	0	0
Vietnam	60,000	30e	30e	120e	90e	2	55e	60e	45e	50e	50e	55e	15e	20e
Yemen Arab Rep.	5,500	0	0	0	0	1	2e	2e	0	0	0	0	0	0
Yemen Dem. Rep.	2,000	0	0	0	0	2	2e	2e	0	0	0	0	0	0
Asia	**2,711,539**	**2,900**	**9,041**	**43,230**	**17,015**	**34**	**38,277**	**41,618**	**21,410**	**22,892**	**34,723**	**37,915**	**17,435**	**18,631**

All figures are metric tons. e = Estimate.

[1] Since Spain and Portugal did not accede to the EEC until Jan. 1, 1986, they are included in Other Europe statistics.

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	Population (1,000)	Number of mills		Capacity (1,000 tons)		Per capita (lb)	Consumption (1,000 tons)				Production (1,000 tons)			
		P & B	Pulp	P & B	Pulp		P & B		Pulp		P & B		Pulp	
							1984	1985	1984	1985	1984	1985	1984	1985
LATIN AMERICA														
Argentina	30,000	86	20	1,290	840	64	960	871	647	633	943	867	664	683
Bahamas	200	0	0	0	0	165	10	15	0	0	0	0	0	0
Barbados	300	0	0	0	0	51	7e	7e	0	0	0	0	0	0
Belize	163	0	0	0	0	27	3	2	0	0	0	0	0	0
Bolivia	5,600	9	5	62e	32e	39	99	99	48	48	59	59	26	26
Brazil	134,000	45	14	4,200	4,000	60	3,286	3,632	3,011	2,825	3,765	4,054	3,957	3,722
Chile	12,000	18	7	433	900	54	839	294	346	334	375	370	839	837
Colombia	28,000	26	6	530	250	35	451	451e	235	235e	365	365e	189	189e
Costa Rica	2,416	2	1	18	25	116	120	127	18	17	14	12	12	12
Cuba	10,000	9	3	150e	60e	51	232e	232e	80e	80e	73e	73e	32e	32e
Dominican Rep.	5,551	2	0	45	0	26	65e	65e	4e	4e	9e	9e	0	0
Ecuador	9,000	9	5	65	25	28	116	113	47	47	72	68	25	25
El Salvador	5,500	3	0	50	0	11	26	28	0	0	27	28	0	0
Guatemala	7,500	4	0	50	0	10	35	34	5	4	35	34	0	0
Guyana	900	0	0	0	0	17	7e	7e	0	0	0	0	0	0
Haiti	5,800	0	0	0	0	2	6e	6e	0	0	0	0	0	0
Honduras	4,000	0	0	0	0	22	98	40	0	0	0	0	0	0
Jamaica	2,226	1	0	5	0	15	15e	15e	4e	4e	4e	4e	0	0
Mexico	79,000	66	17	3,313	1,034	70	2,265	2,514	1,028	1,131	2,240	2,448	801	820
Neth. Antilles	200	0	0	0	0	33	3	3	0	0	0	0	0	0
Nicaragua	2,000	0	0	0	0	26	20	24	0	0	0	0	0	0
Panama	2,200	3	0	30	0	80	80	80	0	0	25	28	0	0
Paraguay	3,200	3	–	25e	25e	18	26e	26e	15e	15e	13e	13e	15e	15e
Peru	19,000	15	4	427e	311e	21	183e	183e	80e	80e	138e	138e	59e	59e
Surinam	390	0	0	0	0	45	8	8	0	0	0	0	0	0
Trinidad/Tobago	1,100	0	0	0	0	20	12e	10e	0	0	0	0	0	0
Uruguay	3,000	5	3	60	30	32	58	44	38	34	54	41	30	26
Venezuela	17,500	10	3	790	174	91	759	724	292	281	558	550	67	68
Latin America	**390,746**	**316**	**88**	**11,543**	**7,706**	**54**	**9,789**	**9,654**	**5,898**	**5,772**	**8,769**	**9,161**	**6,716**	**6,514**
AUSTRALASIA														
Australia	15,749	17	18	1,675	1,158	313	2,203	2,238	1,045	1,053	1,555	1,543	832	887
Fiji	700	0	0	0	0	32	10e	10e	0	0	0	0	0	0
New Zealand	3,265	6	6	860	1,492	400	439	593	587	727	695	770	1,062	1,145
Papua New Guinea	3,300	0	0	0	0	7	10	10e	0	0	0	0	0	0
Samoa	200	0	0	0	0	11	1e	1e	0	0	0	0	0	0
Australasia	**23,214**	**23**	**24**	**2,535**	**2,650**	**271**	**2,663**	$2,852g	**1,632**	**1,780**	**2,250**	**2,313**	**1,894**	**2,032**
AFRICA														
Algeria	20,000	6	3	35	25	18	166	166e	90	90e	86	86e	30	30e
Angola	7,200	2	1	30e	45e	5	16	16e	37	37e	15	15e	35	35e
Benin	3,700	0	0	0	0	2	3	3e	0	0	0	0	0	0
Botswana	900	0	0	0	0	2	1	1e	0	0	0	0	0	0
Burkina Faso	7,000	0	0	0	0	0	1	1e	0	0	0	0	0	0
Burundi	4,600	0	0	0	0	2	4	4e	0	0	0	0	0	0
Cameroon	8,600	0	0	0	0	8	30	30	0	0	0	0	0	0
Central African Rep.	2,300	0	0	0	0	1	1	1e	0	0	0	0	0	0
Chad	4,600	0	0	0	0	0	1	1e	0	0	0	0	0	0
Congo	1,600	0	0	0	0	1	1	1e	0	0	0	0	0	0
Egypt	49,000	16	3	180	60	20	473	449e	65	65e	149	149e	42	42e
Ethiopia	42,000	1	0	12	0	0	9	9	6	8	9	9	0	0
Gabon	600	0	0	0	0	7	2	2e	0	0	0	0	0	0
Gambia	600	0	0	0	0	7	2	2e	0	0	0	0	0	0
Ghana	12,000	0	0	0	0	1	4	5e	0	0	0	0	0	0
Guinea	5,400	0	0	0	0	2	4	4e	0	0	0	0	0	0
Ivory Coast	8,200	0	0	0	0	9	35	35e	0	0	0	0	0	0
Kenya	17,000	5	1	80	60	15	118	118e	57	57e	118	118e	53	53e
Lesotho	1,400	0	0	0	0	2	1	1e	0	0	0	0	0	0
Liberia	1,900	0	0	0	0	1	1	1e	0	0	0	0	0	0
Libya	3,000	20	0	10	0	15	21	21e	6	6e	6	6e	0	0
Madagascar	10,000	2	2	27	7	2	10	10	11	9	10	10	7	5
Malawi	6,100	0	0	0	0	4	12	12e	0	0	0	0	0	0
Mali	7,000	0	0	0	0	0	1	1e	0	0	0	0	0	0
Mauritania	1,700	0	0	0	0	5	4	4e	0	0	0	0	0	0
Mauritius	1,000	0	0	0	0	15	7	7e	0	0	0	0	0	0
Morocco	23,100	8	1	130	100	17	189	178	43	48	112	107	83	81
Mozambique	10,500	2	0	10	0	5	23	23e	3	3e	3	3e	0	0
Niger	5,500	0	0	0	0	0	1	1e	0	0	0	0	0	0
Nigeria	100,000	2	–	80	0	6	222	247	10	35	10	35	1	7
Rwanda	5,100	0	0	0	0	1	2	2e	0	0	0	0	0	0
Senegal	5,800	0	0	0	0	7	19	19	1	1	0	0	0	0
Sierra Leone	3,600	0	0	0	0	1	2	2e	0	0	0	0	0	0
Somalia	3,800	0	0	0	0	1	2	2e	0	0	0	0	0	0
South Africa	25,000	17	10	1,750e	1,250e	114	1,407	1,293	860	825e	1,398	1,510	1,000e	1,030e
Sudan	21,500	1	0	6	0	4	37	37	0	0	3	3	0	0
Swaziland	700	0	1	0	180	19	6	6e	0	0	0	0	178	174
Tanzania	17,750	2	1	65	50	4	28	28e	3	3e	3	3e	0	0
Togo	2,700	0	0	0	0	5	6	6e	0	0	0	0	0	0
Tunisia	6,500	5	1	30	25	25	73	73e	40	40e	28	28e	20	20e
Uganda	13,500	1	0	5	0	1	8	8e	0	0	0	0	0	0
Zaire	29,000	1	0	4	0	1	10	10e	2	2e	2	2e	0	0
Zambia	6,250	1	2	15	15	11	32	32e	15	15e	12	12e	10	10e
Zimbabwe	8,000	3	2	85	40	22	75	80	49	57	67	73	29	32
Africa	**515,700**	**95**	**30**	**2,554**	**1,857**	**13**	**3,070**	**2,952**	**1,309**	**1,303**	**2,034**	**2,172**	**1,488**	**1,519**
TOTAL WORLD	**4,671,667**	**5,633**	**1,034**	**214,261**	**152,800**	**91**	**189,166**	**192,058**	**139,736**	**139,835**	**189,628**	**193,076**	**139,895**	**140,193**

TOP 20 PRODUCING NATIONS

Taiwan

Population: 19,248,000. Per capita consumption of paper and board: 107 kg/ 236 lb. Paper and board mills: 151. Pulp mills:* 3 (sulfate: 2; nonwood: 1).

Paper/board capacity: 2,700,000 tons **Pulp capacity:** 500,000 tons
Operating rate 1985: 75%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	1,481	1,560	149	138	66	45
Board	448	458	0	0	30	48
Total	**1,929**	**2,018**	**149**	**138**	**96**	**93**
Chemical woodpulp	317	342	152	247	32	75
Other pulps	8	8	17	20	1	1
Total	**325**	**350**	**159**	**267**	**33**	**76**

*Market pulp only.

United Kingdom

Population: 55,950,000. Per capita consumption of paper and board: 139 kg/ 306. Paper and board mills: 96. Pulp mills: 6 (semichemical: 2; mechanical: 2; nonwood: 2).

Paper/board capacity: 3,955,000 tons **Pulp capacity:** 480,000 tons
Operating rate 1985: 93% **Operating rate 1985:** 64%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	2,594	2,697	3,705	3,746	283	321
Board	1,042	1,069	823	858	250	253
Total	**3,636**	**3,766**	**4,528**	**4604**	**533**	**574**
Chemical woodpulp	0	0	1,383	1,339	3	1
Other pulps	—	—	253	220	3	2
Total	**190**	**295**	**1,636**	**1,559**	**6**	**3**

United States

Population: 239,300,000. Per capita consumption of paper and board: 282 kg/ 622 lb. Paper and board mills: 571. Pulp mills: 225 (sulfate: 224; sulfite: 18; semichemical: 38; mechanical: 45).

Paper/board capacity: 68,457,000 tons **Pulp capacity:** 53,165,000 tons
Operating rate 1985: 90% **Operating rate 1985:** 86%

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	52,112	51,067	9,686	9,992	2,667	2,420
Board	10,114	10,054	62	62	752	789
Total	**62,226**	**61,121**	**9,748**	**10,054**	**3,419**	**3,209**
Chemical woodpulp	44,234	43,316	3,693	3,791	2,716	2,868
Other pulps	6,089	5,828	380	260	544	574
Total	**50,323**	**49,144**	**4,073**	**4051**	**3,260**	**3,442**

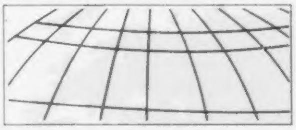
U.S.S.R.

Population: 275,000,000. Per capita consumption of paper and board: 34 kg (e) /75 lb. Paper and board mills: 84. Pulp mills: 57.

Paper/board capacity: 10,750,000e tons **Pulp capacity:** 10,000,000e tons

(000 metric tons)

	Production		Imports		Exports	
	1984	**1985**	**1984**	**1985**	**1984**	**1985**
Paper	5,860	5,960	567	534	1,024	1,030
Board	3,965	3,990	166	166	372	370
Total	**9,825**	**9,950**	**733**	**700**	**1,396**	**1,400**
Chemical woodpulp	6,602e	6,720	192	350	1,010	1,070
Other pulps	1,550e	1,600	—	—	—	—
Total	**8,152**	**8,320**	**192**	**350**	**1,010**	**1,070**



EUROPE

THE UNCERTAINTY THAT is affecting major European markets for most of 1985 resulted in production totals that showed only marginal changes from 1984. No great increases or dramatic declines in paper, board, or pulp output occurred. As 1984 was considered a boom year with record-high production, the 1985 result was certainly not disastrous—hopefully it was only a pause before the upward climb continues.

But the small production differences show that the EEC nations fared slightly worse than in the previous year. Paper and board production fell 0.6%, and pulp output fell 3%. The Nordic nations, whose main market is the EEC, fared rather better. Paper and board production was up 2%, but pulp output dropped 0.6%.

Of the main producing EEC nations, two made less paper and board than in 1984 (France, -4%; Italy, -2.7%). One made about the same amount (Fed. Rep. Germany, +0.4%). Low GNP growth and buyers using inventories were two main reasons for France's drop in ouput, while Italy suffered from weaker export markets. But for Fed. Rep. Germany, exports were the real driving force for the industry. Reports from all three countries indicated an improvement in profits and cautious optimism for 1986.

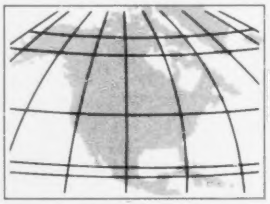
Although Norway set a new output record, the Nordic nations were affected by weaker pulp markets. Prices fell 30% in 1985. Swedish and Finnish pulp exports together dropped 5% from 1984, although paper and board exports, mostly newsprint, wood-containing printing/writing paper, and kraft liner, were up 2.3%. Finland's rationalization program and its move to higher-value products are designed to make it more competitive in international markets. Sweden continues its heavy investment program.

Of the rest, Austria—dependent on EEC markets—enjoyed a 10.7% rise in paper and board production to top the 2-million-ton mark for the first time. And Switzerland just broke the 1-million-ton barrier with a 3.3% increase. Output dropped marginally in both Spain and Portugal; together they made 3.56 million tons of paper and board, down 1%. Portugal increased its pulp output significantly, by 15.8%, producing over 1 million tons of market pulp for the first time.

Eastern European paper output rose 3%, and pulp rose 1.8%. But this is largely due to an estimated figure (based on real 1984 totals) for the dominant producer—the U.S.S.R. Most of the rest had very small increases in paper and board output; some were affected by shortages of chemicals and spare parts. But overall, the continuing trend throughout eastern Europe is toward modernization, increasing capacity, and higher exports in the future.

There were two noticeable points on a 1985 breakdown by grade: the EEC increased its newsprint output by 100,000 tons, mostly due to the rapid rise in U.K. production; and the Nordic nations made 5% more printing/writing paper than in 1984 and 28.5% more than 1983. In contrast, the EEC made 1.5% less than 1984 and just 8.8% more than 1983.

Overall, Europe's paper and board output increased just 0.8% to 65.9 million tons, while pulp production rose 0.6% to 41.9 million tons. Although 1985 brought its weak quarters and its uncertainties, most European mills seem optimistic about their prospects in 1986.



NORTH AMERICA

TOTAL PAPER AND BOARD production in North America in 1985 was 75.6 million tons, 1.3% below the all-time record of 76.6 million tons set in 1984. The fall was due to lower output in the U.S. Canadian tonnage increased 222,000 tons, or by 1.6% to 1.4 million tons.

U.S. output ended the year at 61.1 million tons, down 1.8%. The year was somewhat disappointing for the industry as the U.S. economy as a whole slowed down from the previous year's pace. In addition, the high value of the dollar gave domestic producers trouble by attracting imports and slowing exports.

Imports of coated paper rose 16% in 1985, while overseas shipments of kraft liner, an important export grade, fell by 13%. The drop in kraft liner exports caused production of that grade to drop by 5% to 14 million tons. Market pulp exports appeared unaffected by the strong dollar, rising 8% to 3.4 million tons. Total pulp production amounted to 49.1 million tons, down 2%.

U.S. newsprint production was basically on the same level as the previous year at 5 million tons. Imports, however, rose to 7.7 million tons, up 7.6%.

In Canada, an 11% increase in printing/writing and sanitary paper production led the overall rise in total output for the year. Printing/writing paper totaled 2.1 million tons, up 10%. Tissue output amounted to 453,000 tons, rising 13% from 1984.

Canadian newsprint production was stable at 9 million tons as mills ran at a 92% operating rate. Total pulp production rose slightly to 20.4 million tons because the strike in British Columbian mills in 1984 was offset by downtime in 1985. Market pulp output rose by 3% to 8 million tons. Exports jumped 4.4% to 7.2 million tons.

For the first half of 1986, U.S. production was running at a 63-million-tpy pace, which would be 2% above the previous production record set in 1984. In Canada, total shipments are projected to rise 2.5% to 22.2 million tons in 1986. ■

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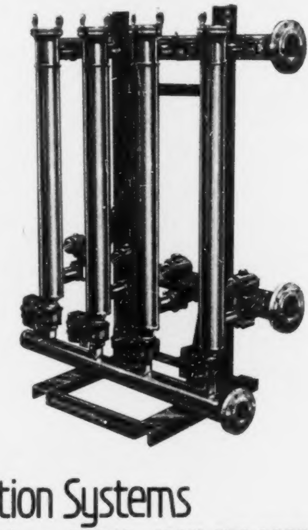

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ISSUE FOCUS: **WORLD REVIEW**

U.S. AND JAPANESE PAPER INDUSTRY LEADERS DISCUSS TRADE DIFFERENCES

Joint Washington, D.C., meeting between chief executives of world's two largest paper industries helps promote better understanding

By WILLARD E. MIES, Executive News Editor

Not all disagreements on trade issues were resolved at a meeting sponsored by the American Paper Institute and Japan Paper Assn. Held Apr. 8-10, 1986, in Washington, D.C., the meeting brought together the leaders of the world's two largest paper industries.

U.S. paper industry executives complained that tariff and particularly nontariff "systemic" barriers limit the ability of U.S. producers to increase their exports to the Japanese market despite their significant cost advantage. Such "invisible" barriers to entry are deeply rooted in Japanese society and business practices, they said. Japanese leaders responded that not only price but quality, service, and a long-term commitment are required to succeed in their home market. Only a few U.S. companies, they said, have shown such patience.

But the wide-ranging discussion between chief executives of both countries—which followed a similar meeting in Tokyo two years ago—resulted in "some progress in better communication and understanding," according to Dr. Irene Meister, API's vice president-international. The meeting also was attended by government officials representing both countries.

BARRIERS STILL EXIST. The U.S. paper industry seeks to substantially increase its exports to Japan and wants to work with Japanese customers to establish long-term supply relationships, said T. Marshall Hahn Jr., chairman and CEO of Georgia-Pacific Corp.

"Despite these efforts, U.S. import penetration remains extremely low in Japan compared with other markets and, for some grades, it has actually fallen," Hahn said (Table 1). Imports of U.S. kraft linerboard, for example, represented 5.4% of Japanese consumption in 1983 but fell to 4.7% in 1984 and may have dropped below 4% in 1985. Imports of U.S. printing and writing papers have remained "so insignificant that percentage figures on penetration are meaningless."

Hahn said that the U.S. paper industry believes that the reason for the low penetration of U.S. pulp and paper in Japan lies with "Japan's barriers to imports, both tariff and invisible barriers that are rooted in the Japanese business system."

While welcoming the December 1985 reduction in tariffs on U.S. paper products in Japan, the U.S. paper industry believes that tariffs between the "world's two largest paper producing and consuming nations should be equalized," Hahn said. "The area of nontariff invisible barriers, however, remains the single most important area that must be addressed. The U.S. paper industry believes that a wide range of commercial, business, and funding practices in Japan continue to restrain imports," Hahn noted. He cited the following examples:

- The operation of the Structural Improvement Law which, by permitting cartels, has not eliminated excess inefficient capacity

TABLE 1: **Exports of selected U.S. paper industry products to Japan (000 metric tons).**

	1985	1984	1979
Newsprint	181	183	127
Printing/writing	1	1	1
Packaging/industrial	12	12	9
Linerboard	150	165	126
Bleached board	171	167	129
Total paper & board*	**526**	**539**	**404**
Woodpulp	753	738	616
Wastepaper	301	309	84

*Total includes minor grade categories not shown above.
Source: American Paper Institute from U.S. Bureau of Census.

TABLE 2: **Reductions of Japanese tariffs on paper and paperboard exports, 1984-88.**

Imported items	4/84	4/85	1/86	4/86	4/87	4/88
Newsprint	4.0	3.9	3.1	—	—	—
Kraft paper	9.3	8.5	6.8	5.7	4.6	3.5
Kraft liner (300 g and lower)	9.3	8.5	6.8	5.7	4.6	3.5
Bleached board	5.9	5.0	4.0	3.5	3.0	2.5
Milk carton	5.1	4.8	3.8	2.5	1.3	0.0

- Financing practices that lead to an artificially depressed market for such products as containerboard by helping to maintain noncompetitive enterprises
- Interlocking relationships between producers, distributors, and financial institutions which, although legal in Japan, perpetuate the "system" that clearly favors domestic producers over imports
- The absence of companies devoted to imports of pulp and paper, leaving imports to distributors for whom domestic sales are more important than imports.

TARIFFS HAVE COME DOWN. Trade relations between the Japanese and U.S. paper industries should be helped by recent large Japanese tariff reductions, the dramatic appreciation of the yen, and the improving outlook for the U.S. economy, according to Jiro Kawake, president of Oji Paper Co. Ltd.

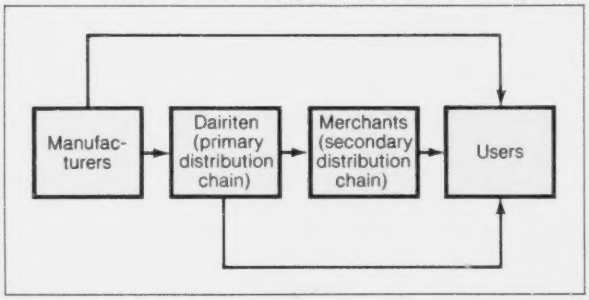
As the result of the recent Market Oriented Sector Selective (MOSS) talks between the U.S. and Japanese governments, Japanese import tariffs have been reduced significantly on paper products and now "can stand comparison with those of Canada and the EC." The tariff on kraft liner (under 300 g), for example, was reduced to 6.8% on Jan. 1 and reduced again to 5.7% Apr. 1. It is scheduled to decline to 3.5% by 1988 (Table 2).

Oji's president denied that serious nontariff barriers to entry of U.S. paper and paperboard into Japan exist. The structural improvement program for the Japanese containerboard industry is a matter of national industrial policy and is not intended to restrict imports. And Kawake denied that Japanese paper manufacturers' partial ownership control of distributors is not an obstacle to entering the Japanese market.

Kawake noted that between 1979 and 1984, U.S. paper and paperboard exports rose from 3.14 million tons to 3.82 million tons—an increase of 677,000 tons. Exports to Japan during this period rose from 222,000 tons to 530,000 tons—an increase of 377,000 tons. Exports to Japan, therefore, accounted for nearly half of the rise. During this same period, exports to Europe fell from 937,000 to 897,000 tons—a 40,000-ton decrease.

STRICT QUALITY REQUIREMENTS. To enter the Japanese market, exporters must not only provide products at a favorable price but must also provide products with a quality level and such service as the customer requests, Kawake said. "Since the level of requirements by Japanese customers is quite severe, long-term, patient efforts are necessary until the customer's satisfaction is gained."

FIGURE 1: **Distribution flow of paper and paperboard in Japan.**


Manufacturers
Dairiten (primary distribution chain)
Merchants (secondary distribution chain)
Users

He noted that in the Japanese newsprint business, the paper break ratio at Japanese publishers' press rooms is about 0.1%, while in North America it is around 3%. In addition, Japanese publishers only keep available inventory for the day, so suppliers must deliver newsprint rolls twice a day for morning and evening editions.

Similar quality and service are also required by the Japanese containerboard market, according to Hisashi Tahara, president of Honshu Paper Co. Ltd. During the past decade, the Japanese containerboard industry has trended toward lighter basis weight and lower-grade containerboard (containing more wastepaper). Several new grades of linerboard have developed in addition to pure kraft linerboard (K' liner and K" liner) and a second grade of C jute liner (C' jute). Last year, K" and C' became the major grades in Japan.

In Japan, containerboard is sold on the basis of calculated weight:

Roll weight = nominal basis weight × length of roll × width of roll

rather than on actual weight. Japanese Industrial Standards (revised in 1985) specify grade, basis weight, and strength requirements. Delivery requirements are stringent, and the size of individual orders has been getting smaller (more than half are less than 500 m or 1,640 ft on the corrugator). A few U.S. linerboard exporters are trying to meet these requirements of the Japanese market, but most are not, Tahara said.

COMPLEX DISTRIBUTION SYSTEM. Japanese paper and paperboard distribution is managed by three organizations—dairiten, merchants, and sogo-shosha. Dairiten are distributors under contract to manufacturers that carry inventories and sell large volumes of merchandise to either end users or merchants. Merchants usually purchase through dairiten as secondary wholesalers and resell to small-to-medium-size customers. Sogo-shosha (trading houses) became involved in the distribution system starting with paperboard mills in the 1960s and have a similar function to that of dairiten (Figure 1).

In 1984, dairiten distributed 82% of the paper and 64% of the paperboard sold in Japan, while sogo-shosha sold 11% and 29%, respectively, according to Akira Seki, president of Japan Pulp & Paper Co. Ltd. There are about 115 dairiten and 680 paper merchants that belong to various trade associations and provide marketing, distribution, planning, and financial services (Table 3 and Figure 2).

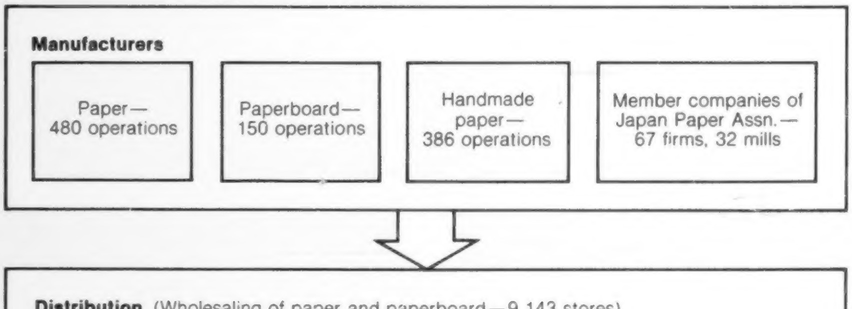
Dairiten usually represent a number of manufacturers, including offshore mills. Seki noted that there has been U.S. criticism that the Japanese distribution system

TABLE 3: **Japanese paper industry distribution channels by grades and users.**

Pattern of distribution	**Major grades**	**Users**
Manufacturer→dairiten→merchant→user	Printing paper Wrapping paper Folding carton boxboard	Small-to-medium-size printers, publishers, folding carton boxboard manufacturers (great number of users who demand small lots and number of standards)
Manufacturer→dairiten→user		Major printers, publishers, folding carton box manufacturers, government agencies (purchasing large volumes in several simple standards)
	Sack kraft paper Containerboard	Bag and corrugating box manufacturers (purchasing large volumes in simple standards)
Manufacturer→user (Dairiten settle) accounts)	Newsprint and some containerboard—part of of business with government agencies	Newspaper publishers in general receive paper every day in the necessary quantity for the day or the following day

Source: Japan Pulp & Paper Co.

FIGURE 2: **Structure of Japanese paper and paperboard manufacturers, distributors, and users.**


Manufacturers
Paper—480 operations
Paperboard—150 operations
Handmade paper—386 operations
Member companies of Japan Paper Assn.—67 firms, 32 mills
Distribution (Wholesaling of paper and paperboard—9,143 stores)
Dairiten
Member companies of Japan Paper Dairiten Assn.—30 firms, 107 operations
Member companies of Japan Paperboard Dairiten Assn.—85 firms, 187 operations
Sogo-shosha
Merchants
Member companies of Japan Paper Merchant Assn.—680 firms, 737 operations
Users (Printers, converters)

	No. of operations
Newspapers	1,592
Publishers	2,523
Printers	34,466
Stationery	1,021
School paper supply	112
Daily paper necessity	471

	No. of operations
Sack kraft	420
Grocery bag	286
Sanitary paper	30
Corrugating box	4,655
Folding carton box	5,506

Source: Japan Pulp & Paper Co.

prevents offshore products that may have an advantage in price from easily entering the Japanese market. Nevertheless, he said that the existing distribution system has proven to be efficient and should not prevent entry of imports.

Another complaint has been that interlocking ownership interests between manufacturers and distributors have made it difficult for U.S. forest products to enter the Japanese market. Although it is true that some manufacturers own substantial stock in dairiten, competing producers may hold interests as well, "which keeps a balance of power in management," Seki said.

SLOWER GROWTH IN DEMAND. The Japanese paper industry will be facing slower demand growth and increased import competition because of the recent sharp rise in the value of the yen and reduction in tariff levels, according to the Japanese chief executives. To survive, Japanese paper companies must continue to rationalize their operations, increase productivity, strengthen their finances, step up research, and expand in size through mergers and acquisitions, noted Tadami Nasu, president of Sanyo-Kokusaku Pulp Co. Ltd.

Japanese companies already have been taking such actions in response to the oil shocks of 1973 and 1979, which resulted in a slowdown in economic growth and paper consumption. Growth in Japanese paper consumption dropped from a rapid 10.6%/year pace in the 1960s to only a 3.2% rate in the 1970s. This reflected a trend to lighter basis weights, increased competition from plastics, and efforts by customers to reduce paper consumption, according to Minoru Ishigami, president of Jujo Paper Co. Ltd.

For the 1985-90 period, paper and paperboard demand is projected to grow at only a 2.4% annual rate compared with a 4% rate for real GNP, according to a Japan Paper Assn. forecast prepared for the joint meeting (Table 4). Consumption is expected to reach almost 23 million tons in 1990, up from 20.4 million tons in 1985.

TABLE 4: **Projected Japanese paper and paperboard consumption by major grades (000 metric tons).**

					Average annual % change	
Grade	**1970**	**1980**	**1985p**	**1990e**	**1980/70**	**1990/80**
Newsprint	1,899	2,565	2,693	2,889	3.1%	1.2%
Information/ communication papers	2,825	4,709	5,960	6,912	5.2	3.9
Wrapping paper	1,191	999	1,124	1,182	−1.8	1.7
Other paper	943	1,528	2,005	2,316	4.9	42
Total paper	6,858	9,801	11,782	13,299	3.6	3.1
Containerboard	3,564	4,749	5,997	6,728	2.9	3.5
Folding carton	1,336	1,444	1,616	1,766	0.8	2.0
Other board	558	812	1,003	1,181	3.8	3.8
Total paperboard	5,458	7,005	8,616	9,675	2.5	3.3
Total paper and paperboard	**12,316**	**16,806**	**20,398**	**22,974**	**3.2**	**3.2**

Source: Japan Paper Assn.

Here is the outlook for major grades:

- **Newsprint.** Consumption has been growing at only a 1%/year rate since 1980. This unusually slow pace mainly reflects a trend to reduced basis weights by Japanese publishers. In 1980, 91.2% of total newsprint production was 49 g/m^2 (30 lb). By 1985, 46 g/m^2 (28 lb) accounted for 88% of production, with 49 g/m^2 down to only 10.9%. On an area basis, growth during the five-year period was 1.9%/year. Although even lighter newsprint is being developed, 28 lb will probably remain dominant until 1990. Newsprint demand is projected to grow at an average annual rate of 1.4%, reaching 2.89 million metric tons in 1990.
- **Printing and communication paper.** Demand is expected to grow at a 3.0% rate over the next five years and reach 6.9 million tons in 1990, spurred by the growth of office automation equipment. Some shift in consumption is expected from wood-free to groundwood papers and from uncoated to coated papers.
- **Wrapping paper.** Wrapping paper has been hard hit by changes in the transportation system and competition from plastic products. After declining at a 1.8% average annual rate during the 1970s, the worst may be over. Demand is expected to increase at a 1.0% pace over the next five years, reaching 1.18 million tons in 1990.
- **Containerboard.** After growing at an annual rate of 5% during the 1970s, consumption of containerboard slowed to a 3% pace in the 1980-85 period. Growth in demand for 1985-90 is expected to be in the 2% to 3% range and should reach 6.7 million tons in 1990. Some end uses that previously showed the fastest growth, such as electronics and food, are being hurt by cooling export business and the near completion of a shift from wooden cases to corrugated boxes in agriculture.
- **Boxboard.** Demand is expected to grow at a 1.8% annual rate during the 1985-90 period compared with a 2.3% rate from 1980-83 and a 3.1% rate for the previous five years, reflecting slower economic growth and efforts by customers to save on packaging costs. At the same time, however, customers have been upgrading board quality for better graphics.

RESTRUCTURING. Because of the slower growth, the Japanese paper industry began a major restructuring program based on the "Temporary Law for Structural Improvement of Specific Industries." The program has been in effect since December 1983 for paper grades (excluding newsprint and household tissue), and since August 1984 for containerboard.

Under these programs, the industry has tried to limit or ban new

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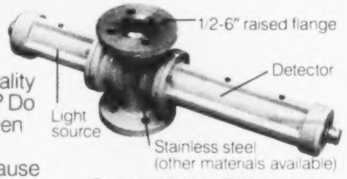

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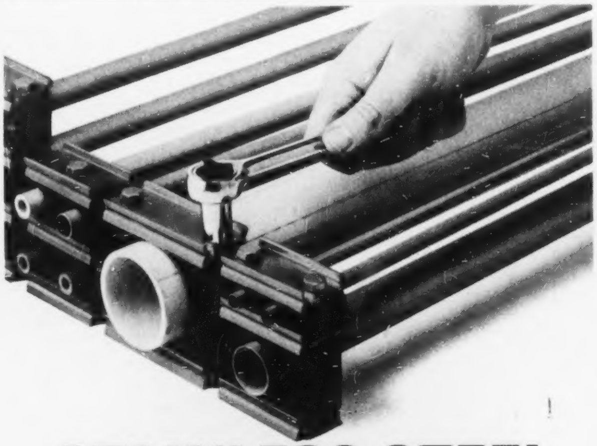

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installations and rebuilds for certain grades while disposing of excess capacity, according to Takashi Saito, president of Daishowa Paper Mfg. Co. Ltd.

Although capital spending has remained high, total Japanese industry paper and board capacity will increase only 0.5% from fiscal 1984 to 25.38 million tons in fiscal 1988. Printing and writing paper capacity will decline by 2.5% (to 7.06 million tons) during this period, and containerboard will increase by only 1.2% (to 7.7 million tons).

CHANGING RAW MATERIAL MIX. While Japanese paper production grew at a 4.0% annual rate during the 1975-85 period, pulp production only grew at a 0.7% pace. "The reason for this low rate of pulp production is that pulp imports and the use of wastepaper have increased in the Japanese paper industry," according to Toshitaka Ikawa, senior managing director, Taio Paper Mfg. Co. Ltd.

Pulp imports have more than doubled from 850,000 tons in 1975 to 1.9 million tons in 1984, with the strongest growth occurring in bleached kraft pulp. North America accounts for about 70% of current pulp imports, although the share of nontraditional suppliers and the use of hardwood has been increasing.

Wastepaper use in Japan has increased significantly because of the oil crises, which increased emphasis on eduction in energy, raw material, and capital costs. Wastepaper consumption rates rose from 37% in 1975 to about 49% in 1985. Development of new deinking technology mainly used for newsprint production and greater use of wastepaper in paperboard also contributed to the growth.

Also helping to increase the use of wastepaper as well as domestic pulpwood consumption was a sharp rise in imported woodchip costs in the early 1980s. Total pulpwood consumption by Japanese mills rose from 33.1 million m^3 in 1974 to a peak of 33.6 million m^3 in 1979. This dropped to 30.7 million m^3 by 1984. The share held by imported pulpwood declined from 46% in 1979 to 40% in 1984, which was the same level as in 1974.

The U.S. share of imported pulpwood dropped from 63% in 1974 to 42% in 1984, with an increasing volume of pulpwood coming from Australia, Canada, New Zealand, and South Africa.

IMPROVED PROFITABILITY. Profitability of the Japanese paper industry has lagged behind other manufacturing because of interest costs from heavy debt built up during its earlier rapid expansion phase. Profitability, however, improved greatly, in fiscal 1983-84, helped by efforts to reduce pulpwood and energy costs, according to Tadami Nasu of Sanyo-Kokusaku. But Japanese paper industry profits may come under pressure again because of recent weakening in paper and paperboard prices, slower economic growth, and increased competition from imports. ■

MANAGEMENT

PAPER INDUSTRY SHOULD BRACE FOR GROWTH OF EDI SYSTEMS IN BUSINESS

Adoption of new electronic data interchange technologies throughout business world could cause significant loss in business forms market

By JAMES L. HUTCHISON

The U.S. is on the threshold of implementing new technologies broadly referred to as electronic data interchange (EDI) that will allow business, governmental agencies, and other organizations to conduct business electronically. This action could result in a significant loss in the market for business forms paper by 1995.

There are those that say that the growth in demand will continue close to that experienced in recent years because people will still desire printed copies of the documents, even though electronic communications are used.

I have heard similar comments over the last 30 years in reference to other paper products in the data processing field. I can recall in early 1967 a sales manager forecasting that tabulating card stock would continue to grow at 5% a year for the foreseeable future. Tabulating card stock hit its peak in 1969, two years after the forecast, and during the last 15 years has declined from 550,000 tons to less than 100,000 tpy. Another example is one-time carbonizing paper. In 1974 the trend flattened, and the downturn in usage started in 1980. History clearly shows we cannot assume that the demand for a particular type of paper will continue simply due to economic growth.

Before getting into details, it is important to define the term "electronic data interchange" or "EDI" as it is used in this article. EDI is designed to replace human-readable, paper-based, business documents such as orders, shipping manifests, or invoices, with machine-readable, electronically coded document transmissions from one organization's computer to a computer of a trading partner or between units of one organization. Machine-readable is a key term. EDI, in my definition, is not telex, unformatted human-readable electronic mail, or other textual transmissions.

Second, my figures for business forms paper include form bond, groundwood form bond, and carbonless. They do not include one-time carbonizing and bristols. Nor do they include cut-size papers.

In 1985, the market for business forms paper in the U.S. was approximately 2.6 million tons. This tonnage represents about 26% of total uncoated free-sheet consumption. It is estimated that about 30%, or 800,000 tons, is devoted to external business transaction communications, of which 300,000 tons are business to business. The remaining amount is from business to consumers. An additional 800,000 tons are used internally for transaction purposes. The total tonnage in business transactions is therefore about 1.6 million tons. The remaining tonnage is divided into 800,000 tons for management reports and 300,000 tons for other uses.

The status of EDI in the U.S. can be better understood by examining the industries potentially involved and the steps being taken toward implementation.

Rance Consulting of the U.K. published a diagram in 1982 that describes the volume of business transactions at different levels of the distribution process. Rance noted that the frequency of transactions increases exponentially as the process moves from the raw material level through the levels of production and distribution.

He assumed that five could be the average multiple as the process moved upward from one level to the next. Thus, for each sale by a raw material supplier there would be five sales from commodity producer to the converter, 25 sales moving to wholesalers/distributors, 125 sales moving to retailers, etc. I believe this is a good illustration of the relative magnitude of transactions. The sale from the retailer to the final consumer will probably not shift significantly to an electronic payments system by 1995, but the remaining portions of the triangle require closer review.

A few years ago people thought that EDI would be most likely to occur first at the lower portion of the triangle, i.e., close to the raw material supplier because larger companies would be the most capable of buying hardware and developing the software needed. It is notable that in the U.S. the reverse seems to be true, i.e., it is the business sectors at the top of the triangle—the retail-wholesale business with the larger volume of business transactions—that have been in the forefront of the

---

Mr. Hutchison is vice president, paper group, American Paper Institute, New York, N.Y.

movement to EDI. In other words, it is not the size of the organization but rather the volume of transaction documents that is the major motivating force.

INDUSTRIES MOVING TO EDI. Starting at the retail level, the retail grocery industry commissioned the consultant firm of Arthur D. Little to conduct a feasibility study. ADL estimated that about 100 million business transactions documents are generated per year between food producers, distributors, and retail stores. The grocery industry has created a communications standard for electronically transmitting these documents.

This system will ultimately work in the following manner. Each product has an inventory level stored in the computer. As items are scanned out of inventory, the computer decreases inventory count and automatically communicates a reorder to the central warehouse or distributor. The distributor then groups these reorders in truckloads and ships them to the stores. Upon arrival, the store scans the material received, updating the count in the computer. The system would work in a similar way between the distributor and manufacturer.

The grocery industry was somewhat slow in using the system, but by early 1986 the companies in the industry realized that it had become the accepted way of doing business. Seventy percent of the manufacturers and over one third of the supermarket chains are now actively involved in the system in some manner.

In nonfood retailing, K Mart is one of the largest general merchandise chains. It issues an average of 200,000 purchase orders to vendors every operating day. This company is encouraging the use of EDI by holding classes for vendors and emphasizing the savings possible with an EDI system.

The wholesaling/distributing sector of the economy is presently the most active sector because it must communicate forward to the retailer and back to the supplier. The National Industrial Wholesalers Assn., the National Office Products Assn., and the wholesale drug industries have all established EDI systems that will be operational this year.

In manufacturing, some companies in the paper industry have been involved in steps leading to EDI for the last two years. A few companies are presently transmitting shipping manifest information to some customers. The move to EDI will accelerate markedly in 1986. In addition, about a half dozen companies have developed online interactive systems to provide improved com-

PAPER INDUSTRY LAUNCHES EDI TO AID CUSTOMERS

When U.S. paper and paperboard mills make shipments to customers this year, a significant number of them will communicate with the buyer of the product by a new means: electronic data interchange (EDI).

American Paper Institute vice president James Hutchison explained the industry's plans in a statement issued during API's annual Paper Week meeting. The EDI systems discussed by Hutchison were developed jointly over the last two years by API, Graphic Communications Assn., American Newspaper Publishers Assn., Canadian Pulp & Paper Assn., National Paper Trade Assn., "and related trade associations," he said.

So far the industry has focused primarily on developing electronic shipping manifests, although standards for electronic transmission of other data are being produced as well. API initially issued guidelines for the use of bar codes in November 1983. Bar codes are used to read information from rolls of paper and enter the information into a computer system.

Once the information exists in electronic form, it can be communicated in two ways, Hutchison explained. First is the online/interactive system in which one party transmits data directly to the other and can also respond to requests from the receiving party. Second is the batch system in which a collection of information is assembled and then sent in a single, discreet communication from one party to another, either directly or through a third party that acts as an intermediary.

In February 1985, GCA issued a set of standards called Embarc, which is "designed to provide for the transmission of shipping manifest information from paper mills to merchants, printers, and publishers." Hutchison noted that companies that have been involved in developing Embarc "already have or will shortly commence transmissions utilizing Embarc."

In October 1985, a group of about 40 representatives of paper companies, merchants, and printers met to hear presentations from three companies that act as electronic intermediaries—in effect, receiving shipment data and other information from mills and then taking the responsibility for ensuring transmission to the customer.

The group chose General Electric Information Services Co. to be the "recommended network" for paper shipments. Mills may choose to communicate with customers through GEISCO, or they can communicate directly or by any other means they desire. The intermediary system has been tried out successfully, first with three mills each transmitting to one customer, and then with several mills communicating to multiple trading partners.

Containerboard mills. Meanwhile, API's Fourdrinier Kraft Board Group (FKBG) worked out a version of the American National Standards Institute's ANSI X-12.10 EDI system. The final text of the FKBG standard was published Mar. 31, and containerboard mills are expected to begin electronic transmission of data using the FKBG/ANSI standards in the second half of 1986.

Hutchison explained that "ANSI standards will be used by the containerboard segment of the paper industry, as well as practically all U.S. industries, including automobiles, aluminum, steel, chemicals, and retail stores." In addition to shipping manifests, there are also ANSI standards for "orders, invoices, and other business transaction documents."

A few companies have worked to develop their own interactive systems, but some buyers have asked the industry to develop more uniform standards for such transmissions. Work toward such simplification "will be a major activity in 1986," according to Hutchison.

munication with customers. The automobile, steel, aluminum, chemicals, and electrical industries will also start to operate their planned EDI systems this year.

Transportation was one of the first industry sectors to adopt EDI standards and establish a communications network. In 1984, 90% of all rail waybills were exchanged electronically. Bills of lading and freight bills are also being transmitted. In addition, 40 motor carriers are using the system.

Bank-to-bank EDI is very advanced. However, a great deal of sophistication is required in the payment of funds from one company to another through the banking system. This program is still in development, and we are not likely to see any significant impact on paper checks in the U.S. until after 1995.

In government, the Customs Service is planning to initiate an electronics system this year, with the goal of handling 80% of the documents via EDI by the early 1990s. The Customs Service has the motivation to move to EDI because of the large volume of documents it must handle. In 1980, it processed 4.4 million entries and anticipates that this number will double by 1990. Each entry represents about 50 pieces of paper.

IMPACT ON PAPER USE. It is clear that a major move is under way to use EDI and related technologies. The question is how much paper will be replaced and when it will happen.

- McDonald Douglas, a third party network operator, forecasts that EDI will grow about 70% per year, from $600 million in revenue in 1986 to $3 billion in 1990.
- A consultant company, the Yankee Group, states that "the scope of the intercompany network market is ultimately as large as the entire business community. Eventually, almost every business, regardless of industry and size, will become a candidate for intercompany networking."
- Arthur D. Little estimates that by 1995 at least 50% of grocery industry business transactions will be handled electronically.

All these organizations predict that the use of paper to parallel the electronic communication will be eliminated *as quickly as possible.*

Some say that the only papers that will be replaced by EDI are the documents moving through the mail. However, I believe the use of electronic transmission in business transactions will result in a major reduction in hard copy used internally in support of these transactions. As a result, the reduction in the amount of paper used within a company relating to business transactions will have a far greater impact on overall paper use than the copies now mailed.

Of course, two other factors also have to be included in the equation when future demand is considered: the rate of growth of the U.S. economy and the consumption of business forms papers for end uses other than business transactions. I am presenting what I believe are reasonable forecasts of growth rates of paper from 1985 to 1990 and 1995. The percentages are not meant to be precise forecasts but were used to establish the potential impact of EDI on business forms. You can see that growth in forms management control is still expected (Table 1).

TABLE 1: **U.S. consumption of business form papers (000 short tons).**

End use	1985	1990	1995 with 25% loss of 1990 transaction document levels to EDI	1995 with 40% loss of 1990 transaction document levels to EDI
Business-to-business	1,100	1,350	1,000	810
Management reports and other	1,500	2,000	2,650	2,650

Note—levels in 1995 with no EDI: business-to-business, 1,500; management reports and others, 2,700.
Source: American Paper Institute, James L. Hutchison, presentation to API Paper Week, March 1986.

As far as tonnage is concerned, since it is not possible to forecast exactly what the impact will be, I have developed data based on an assumption of EDI penetration of 25% and 40%. This does not mean 25% of all businesses would adopt EDI but rather that EDI will make up 25% of the volume of business transactions. It is estimated that 20% of the companies account for about 70% of the business transactions.

If we assume 40% of business transactions will be handled electronically in 1995, the market for business forms paper in the U.S. would equal about 3.46 million tons, about 3% higher than in 1990. Another comparison is to consider what the difference between the 3.46 million consumption would have been without EDI, as shown in the right-hand column of Table 1. You can see that difference is 740,000 tons.

On the other hand, if the move to EDI is made by only 25% of the business transaction and related papers, a 9% increase in consumption would occur from 1990 to 1995.

Whether the figure is 25%, 40%, or some other percentage, it is clear that EDI use is due to grow at a phenomenal rate in the U.S. over the next ten years and that significantly less paper will be used in business transactions than would be expected by projecting historical growth trends.

Electronic data interchange will not only impact the consumption of paper. It will also cause a major change in the way paper companies and all U.S. industry conducts business. The relationship between buyers and sellers will be altered. The time frame for providing information to the customer will be reduced. Managers will have to learn to more effectively use electronically provided data in analyzing their market performance. This is the watershed year! ■

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PULP & PAPER

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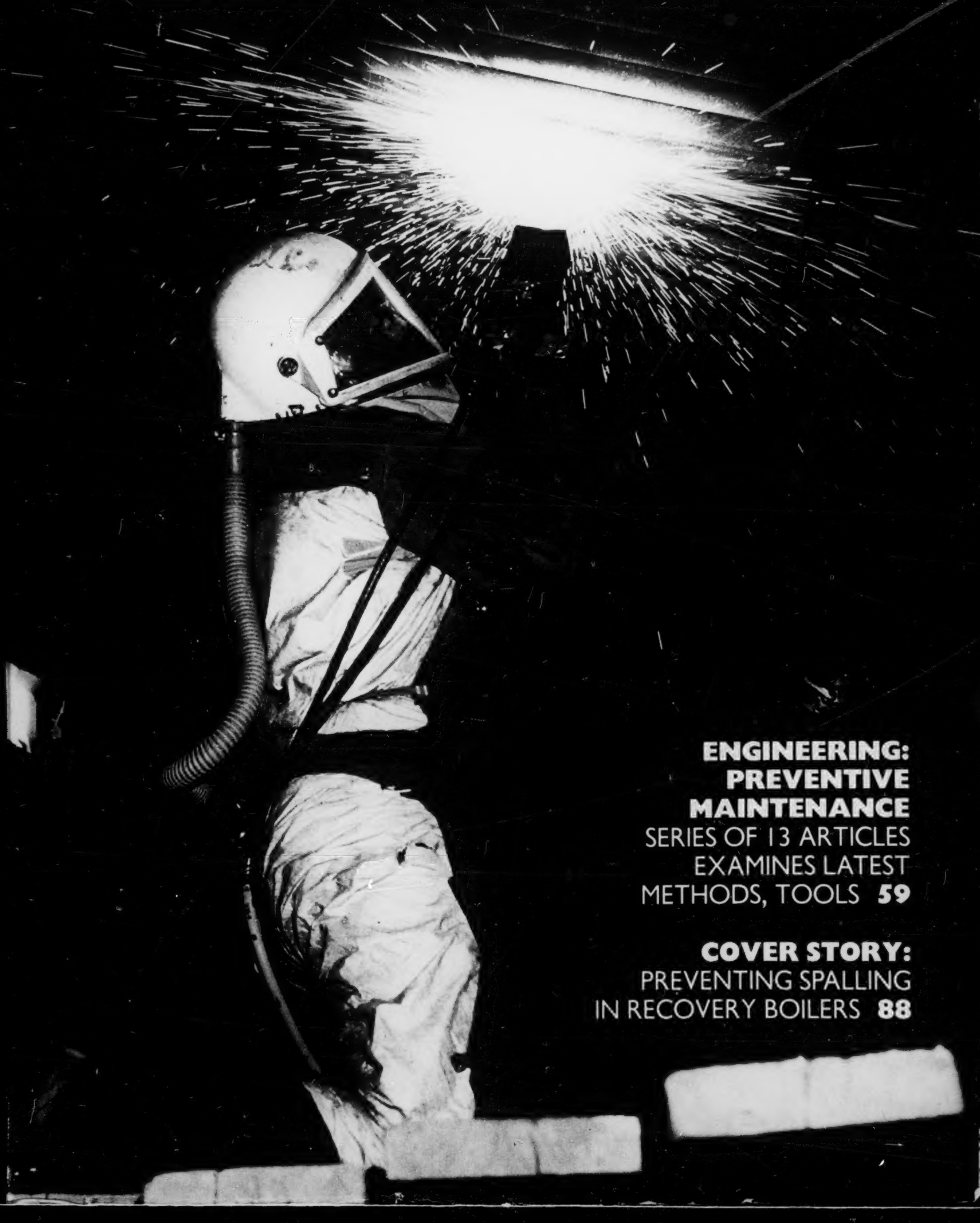

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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Subscriptions & Address Change: Sent without charge in the U.S.A. & Canada (upon written request) to individuals in pulp, paper, and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $50.00 a year in the U.S. All subscriptions to other countries: $70.00 a year, except Europe and Mediterranean, $80.00 (air service included). Single copy, $4.50, except Buyers Guide, $30.00. Photocopies of articles and complete microform volumes available through University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106.

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Send subscription correspondence to:
Circulation Department, PULP & PAPER,
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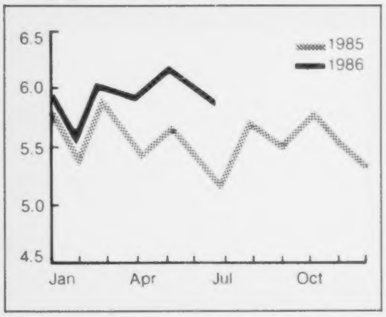
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard in June totaled 5.9 million tons, a gain of 7.2% compared with the same month last year, according to American Paper Institute data. The trend of production continued strong and steady in June at a record 70.5 million tpy, the same as in May. Production for the first half of 1986 was at a seasonally adjusted pace of 70.1 million tpy, also a record rate. The rate of production for the first half was a solid 4.8% higher than 1985 and 2.4% above the previous high reached in 1984.

Among major grades, paperboard continued to lead the way, with bleached and recycled board both up over 8% and the major-tonnage kraft paperboard sector up 6.3% thanks to strong domestic demand and the revival of export markets. Strength in paper was confined mainly to uncoated free-sheet, up 8.2% from depressed levels in 1985. Newsprint continued to make a slow recovery, but coated papers remained weak.

Canadian newsprint shipments jumped 8.9% in June to 806,000 metric tons. Shipments were up only 1.2% for the first six months. Pulp was much stronger, with shipments up almost 10% in June and 12% for the first half. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	June	463	3.1	5582	1.8
Uncoated groundwood (s)	June	122	7.0	1485	0.9
Coated paper (s)	June	506	11.0	6049	−1.8
Uncoated free sheet (s)	June	876	11.2	10430	8.2
Other printing/writing	June	106	−9.4	1363	1.0
Total packaging and other paper (s)	June	417	0.0	5167	−0.8
Tissue	June	421	1.4	5109	3.5
Total paper	**June**	**2911**	**5.5**	**35186**	**2.8**
Unbleached kraft paperboard	June	1508	13.7	17487	6.3
Semichemical medium	June	452	7.9	5301	5.2
Bleached paperboard	June	347	6.8	4302	8.8
Recycled paperboard	June	670	0.3	8230	8.1
Total paperboard	**June**	**2978**	**8.8**	**35320**	**7.0**
Total U.S. paper and paperboard output	**June**	**5889**	**7.2**	**70506**	**4.9**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	May	4732	4.6	56617	3.8
Market pulp production	May	613	13.1	7313	5.7
Wastepaper consumption at paper/board mills	May	1427	16.7	16490	7.9
Pulpwood consumption (cords)	May	7499	6.0	90864	4.4
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	June	23.419	10.0	139.906[6]	20.1
Containerboard inventories at U.S. box plants and mills	June 1	2373	−18.8		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	May	996	5.4	11267	0.0
Imports of Canadian newsprint	May	727	6.3	8198[6]	−0.6
U.S. paper exports (including products)	May	408	37.4	4661	19.1
Exports of unbleached kraft linerboard	May	193	82.1	2153	31.5
Exports of woodpulp	May	365	18.1	4431	18.5
Norscan pulp inventories[4]	June 30	960	−33.7		
Norscan pulp operating rates[4]	June	94%	89%	97%	90%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	June	806	8.9	4540[6]	1.2
Operating rates	June	94%	89%	93%	94%
Inventories held by U.S. consumers	June 30	1372	−7.0		
Other paper/board shipments	June	487	12.0	2975	9.7
Woodpulp shipments (export only)	June	680	9.7	3842[6]	12.0
Operating rates	June	95%	96%	92%	88%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

UNCOATED GROUNDWOOD PAPERS: U.S. producers feel competition from Canada, LWC oversupply

Grade structure: Uncoated groundwood papers can be considered value-added newsprint—the physical properties have been enhanced by superior brightness and smoothness. At the higher end of the spectrum, supercalendering adds a finish, allowing these papers to compete with lightweight coated (LWC) groundwood papers in the marketplace. Typically, brightness levels range from 64 to 72 Elrepho compared with 56 to 62 for standard newsprint. Major end uses include Sunday magazines, preprinted inserts, catalogs, directories, and forms. Basis weights range from 20 to 45 lb/3,300 ft².

Production/capacity: Coming off a record year in 1984, U.S. uncoated groundwood paper shipments fell 3.1% to 1.52 million short tons in 1985. Canada experienced another strong year in 1985, with total "official" shipments of 1.14 million short tons, up 14.3%, according to Canadian Pulp & Paper Assn. data.

Because of U.S. tariff nomenclature, a substantial portion of Canada's uncoated groundwood production may be classified in the newsprint category when it enters the U.S. Official estimates of Canadian capacity are therefore believed to be half or even less than half of the actual total.

Swing machines, which can produce either newsprint or groundwood papers in response to changing markets, also make capacity estimates difficult. The Canadian figures shown in the accompanying capacity table are based on estimated actual 1986 production levels.

Outlook: U.S. uncoated groundwood paper shipments through May were running 0.1% below a year ago. Signs indicate that the market will at least hold steady through the end of the year. New orders for U.S. mills have been running 9.9% ahead of a year ago, and backlogs have risen. Advertising forecasts have been revised upward, demand for newspaper inserts remains strong, and increasing competition in the development of regional telephone directories have been boosting demand for the lower-end directory paper grades.

The weak Canadian dollar, however, has enabled Canadian mills to undercut U.S. pricing and may further boost imports from north of the border. But the decline in the U.S. dollar has caused groundwood paper imports from Europe (mainly supercalendered grades) to fall off during the first half.

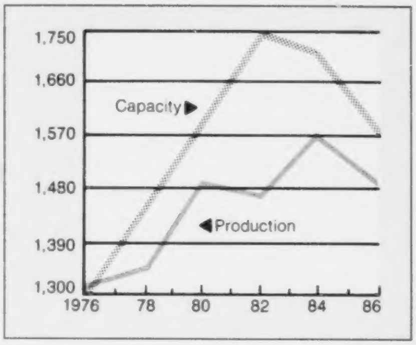
U.S. capacity to produce uncoated groundwood papers will decline slightly this year, although official Canadian capacity will jump 11.5% from 1985. Over the entire 1985-88 period, U.S. capacity will decline 0.6% while Canadian capacity jumps 28%, mainly as the result of machine conversions from newsprint. These figures, however, do not include Lake Superior Paper Industries' 245,000-tpy supercalendered (SC) mill in Duluth, Minn., scheduled to start up in 1988. In addition, a Norwegian company is studying a new 220,000-short-tpy SC mill in Quebec.

Pricing: Another factor causing increased price competition in the U.S. groundwood papers market has been growing oversupply and price weakness in coated paper grades. On the other hand, announced newsprint price hikes, effective in the fall and later, might result in higher pricing for the lower-end groundwood grades. Prices in 1986 will continue to respond to these conflicting pressures.

List prices for some groundwood grades ($/short ton) for 34-lb supercalendered are: 1982, $635; 1983, $638; 1984, $708; 1985, $780; midyear 1986, $740.

Prices for 35-lb offset, 65 brightness are: 1984, $515; 1985, $544; midyear 1986, $535. For 30-lb standard rotonews: 1978, $331; 1979, $371; 1980, $435; 1981, $491; 1982, $508; 1983, $501; 1984, $515; 1985, $510; midyear 1986, $485. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

	1984	1985	1986e
Production[1]	1,565	1,516	1,489
Capacity[1]	1,704	1,644	1,587
Utilization rate	91.8%	92.2%	93.8%
Imports	1,298	1,027	896
Exports	30	37	53
Apparent U.S. consumption	2,833	2,506	2,332
lb/capita	23.91	20.97	19.43
GNP ratio[2]	0.81	0.70	0.63

e = *P & P* estimate.

[1] American Paper Institute data.

[2] In 1982 constant dollars.

TOP PRODUCERS *(000 tpy)*

	Annual capacity			Market share
	U.S.	Canada	Total	(%)
1. Abitibi-Price	—	412	412	11.5
2. CIP	—	395	395	11.0
3. Boise Cascade	24	289	313	8.7
4. Con-Bath	—	290	290	8.0
5. GNN	289	—	289	8.0
6. Champion Intl.	286	—	286	8.0
7. MacBlo	—	275	275	7.6
8. Domtar	—	210	210	5.8
9. Madison	200	—	200	5.5
10. CZ	150	—	150	4.2

Market share of top five companies:
47.2%

Market share of top ten companies:
78.4%

Total North American capacity (1986):
3.598 million tons

B Mill this month at a 450-tpd level. The mill has been shut down since March 1985 because of depressed pulp prices and high operating costs.

During final negotiations, Repap agreed to pay another C$10 million for the assets, raising the total cost of the acquisition to C$110 million, Petty said in a recent newspaper interview. With planned improvements to both the Prince Rupert complex and the Terrace sawmill, total financing will amount to about C$130 million; $75 million is from a loan by British Columbia Development Corp. ■

Speculation abounds on BCFP's future

Turnover of 41.5% of British Columbia Forest Products Ltd.'s ownership to two investment dealers in May continues to breed speculation concerning what's in store for the company. Possibilities include a leveraged buyout or takeover (*P&P*, July, p. 21).

The change in BCFP's ownership began early in May with Alberta Energy Co.'s sale of its 18% stake to Gordon Capital Corp. and Merril Lynch Canada Inc. Shortly afterward, the two companies sold the stock to individual and institutional investors and bought a 26.3% stake in BCFP from Brunswick Pulp & Paper Co., a joint venture between Scott Paper Co. and Mead Corp., as well as another 15.2% share owned by Mead alone.

Since May, Gordon and Merrill Lynch have transferred their holdings into a company called BCFP Holdings Ltd. and have filled Mead's two spots on the board of directors with their own appointees. The new directors are Jean Chretien, former Liberal Party cabinet minister and now consultant with Gordon, and Howard Kellough, a Vancouver, B.C., attorney. ■

MERGER BRIEFS

■ **Scott Paper Co.** has declared a dividend of preferred share purchase rights as part of a plan to defend against "unilateral actions by hostile acquirers" that would deprive holders of fair value.

■ **Pentair Inc.** has agreed to buy McNeil Corp., an Akron, Ohio-based manufacturer of industrial products, for about $83 million. In 1985, McNeil earned $4.4 million on sales of $178.4 million. Pentair had earnings of $20.1 million on sales of $534 million. ■

SALES/EARNINGS

Industry earnings rebound in second quarter

Second-quarter earnings of U.S. paper and forest products companies were up 13.1% on flat sales this year over the same quarter in 1985. This was the first increase in industry profits after four quarters of negative year-to-year earnings comparisons. The upswing was largely attributed to the weakening dollar—improving export shipments and pricing in both overseas and domestic markets—and to cost-control programs now in force at many companies. Further strengthening in pulp and paperboard markets—which were most adversely affected last year by the strong dollar—leads many companies to predict a healthy third quarter.

International Paper Co.'s earnings jumped 103% over second-quarter 1985, living up to hopes expressed last quarter by IP's chairman and CEO, John A. Georges. He said that the lower value of the dollar and strong demand for most of the company's product line led to the big upswing.

U.S. paper/forest products industry second-quarter results.

Companies	Sales	Change 1986/85	Earnings[1]	Change 1986/85
Boise Cascade	$945,090	−0.8%	$31,330[3]	−1.1%[2]
Bowater Inc.	226,509	−1.8	14,762[2]	−3.0
Champion International	1,096,412	−31.4	50,455	−16.4
Chesapeake Corp.	154,472	79.5	2,973	−44.9
Consolidated Papers	165,187	−11.8	24,910	−15.2
Federal Paper Board	211,581	10.6	7,527	538.9
Fort Howard Paper	394,148	5.7	46,767	6.8
Georgia-Pacific	1,930,000	7.8	86,000[3]	28.3
P. H. Glatfelter	73,235	3.6	10,803	2.0
Great Northern Nekoosa	502,100	4.5	−300[2,3]	n.m.
Hammermill Paper	456,161	4.3	22,058[2]	103.9
International Paper	1,230,000	6.9	71,000	102.8
James River (4/27)	693,900	8.0	23,000[2]	−32.4
Jefferson Smurfit	259,114	123.1	6,739	20.6
Kimberly-Clark	1,087,700	8.0	68,800	-13.0
Longview Fibre (4/30)	114,808	4.7	7,172	69.6
Louisiana-Pacific	394,050	14.2	24,540[2]	349.5[2]
Mead Corp.	768,300	6.3	34,600	4.5
Mosinee Paper	48,578	5.3	1,807	−18.2
Pentair Inc.	133,737	0.5	3,779	−42.2
Pope & Talbot	76,128	−10.7	3,623	97.3
Potlatch Corp.	249,878	0.5	19,431	84.3
Scott Paper	829,500	9.0	56,300	6.0
Sonoco Products	246,998	6.8	15,381	13.1
Southwest Forest Industries	158,518	10.1	1,856	50.8
Stone Container	527,850	74.6	3,476	150.3
Temple-Inland	313,500	−4.0	19,300	−20.2
Union Camp	499,400	4.6	28,602	15.7
Wausau (5/31)	57,714	9.0	3,314	37.5
Westvaco	435,747	−0.1	18,647	−18.8
Weyerhaeuser Co.	1,497,396	6.9	68,380	14.6
Willamette Industries	309,810	1.9	19,336	9.6
Total	**$16,087,541**	**−0.1%**	**$796,368**	**13.1%**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. **Boise Cascade:** Includes $17.8-million pretax gain in year-earlier period from sale of mill. **Great Northern:** Earnings include one-time pretax charge of $41 million from restructuring Great Northern Paper. **Hammermill:** Includes pretax gain of $6.75 million from a contract settlement. **James River:** Includes pretax charge of $4.0 million for consolidatoin of coating operations. **Louisiana-Pacific:** Includes a $2.4-million pretax charge relating to gain on sale of a sawmill and a reserve loss on a venture capital investment.
3. Change in method of accounting effective Jan. 1, 1986, reduced pension costs. n.m. = Not meaningful.

Georges foresees continued improvement if the dollar holds steady.

A more modest improvement of 16.4% over last year's period was turned in by Champion International Corp. This was attributed to "higher profits in wood products and some reduction in overall operating costs." Andrew C. Sigler, chairman and CEO, said he is "particularly pleased with the pickup in uncoated grades. Lightweight publication papers continue to be under considerable pressure, but there has been gratifying progress in all other paper grades, as well as in wood products and packaging." He said the company (still digesting its 1984 purchase of St. Regis Corp.) is "continuing to go ahead with sweeping cost-reduction efforts."

Hammermill Paper Co. had the second-best second-quarter earnings in its history. The company said that its performance was helped by cost containment programs and price improvements for some of its products.

Paperboard going strong. Federal Paper Board Co. reported record sales for the quarter and greatly improved earnings. John R. Kennedy, president of Federal, said the improvement was the result of "selling price increases in both market pulp and bleached paperboard and improved efficiencies at the Riegelwood, N.C., mill and the Augusta, Ga., mill." Kennedy said that bleached board backlogs at both of these mills exceed 35 days, and a further bleached board price increase of 8% to 10% per ton on packaging grades was effective Aug. 1.

Stone Container Corp. returned to profitability in the second quarter after a first-quarter loss. Again, better product prices provided the main thrust. Company president Roger W. Stone observed "industry shipments of corrugated containers increased more than 7% for the quarter and 6% for the first six months. Operating rates for kraft linerboard mills ran at more than 98% in the quarter." Stone plans to increase corrugated container prices by 8% this month.

Chesapeake Corp. said that its net income for the quarter was $3.0 million compared with a first-quarter loss of $2.5 million. The company said that production from its new Tri-Kraft linerboard machine has continued to improve along with linerboard prices. Chesapeake's containerboard division is thriving, with shipments up 9% from a year earlier and more improvement expected this quarter.

Potlatch Corp. also reported sharply higher earnings and said that it expects "generally positive conditions" for the remainder of the year. All of the company's major businesses reported income gains during the first half of the year, and Potlatch's wood products group had its second consecutive profitable operating period.

Tissue still competitive. Kimberly-Clark Corp.'s sales improved by 8% over year-earlier levels, but profits were down partly due to "the cost of new product introduction and extensive promotions" in the highly competitive market for disposable diapers. Scott Paper Co. fared better, with a 6% increase in income and record second-quarter sales. Philip E. Lippincott, chairman and CEO, said improved earnings of Scott's domestic sanitary paper products business and "excellent results" from international subsidiaries fed the record quarter.

James River Corp., which completed its fiscal year on Apr. 27, showed an 8% improvement in earnings for its fourth quarter but recorded a 32.4% loss in earnings. The decline was attributed to "decreased income from consumer tissue and bleached paperboard and continued low prices for consumer tissue.

Wood products much improved. Georgia-Pacific Corp.'s earnings for the quarter were up 28.3% from last year's level. Weyerhaeuser Co.'s sales were up 7%, and earnings were up about 15%. Louisiana-Pacific Corp. enjoyed its third-highest quarterly earnings and its highest quarterly sales in its history. ■

Canadian second-quarter profits increase 126%

Second-quarter earnings of Canadian pulp and paper companies rebounded strongly thanks to healthy demand and improving prices for pulp and some paper/board grades (excluding newsprint), cost reduction programs, and the weak Canadian dollar. A survey of results from 11 Canadian companies shows that aggregate earnings surged 126% from depressed 1985 levels on a 9.6% increase in sales.

MacMillan Bloedel Ltd. reported the largest increase in profits, racking up a 529.5% rise in second-quarter 1986 income vs last year's period (which, in turn, was a ten-fold improvement over the 1984 quarter). The company said its gains reflect higher shipment volumes of lumber, newsprint, pulp, and containerboard, and price improvements for pulp and containerboard. MB also credits its cost-reduction program and higher-value products.

MB's performance was a major contributor to the improved picture for Noranda Inc.'s Forest Products Group, which reported second-quarter 1986 after-tax operating income of $34.9 million, up 1,242.3% from the 1985 quarter. (Noranda's Forest Products Group also includes Fraser Inc., James Maclaren Industries Inc., and major holdings in Northwood Pulp & Timber Ltd.)

Canfor Corp.'s CEO, Peter Bentley, attributed the company's turnaround to continued reductions in manufacturing and distribution costs plus

Canadian paper/forest products industry second-quarter results.

Companies	Sales	Change 1986/85	Earnings[1]	Change 1986/85
Abitibi-Price	C$701,700	5.9%	C$24,600	15.5%
British Columbia Forest Products	324,200	11.8	20,000	181.7
Canfor Corp.	288,800	−6.1	11,200	n.m.[2]
Consolidated-Bathurst	515,200	15.7	24,900	2.9
Crown Forest Industries	242,500	11.4	10,500	133.3
Domtar Inc.	574,300	8.9	29,100	55.6
Donohue Inc.	114,400	8.4	4,200	0.0
Great Lakes Forest Products	164,580	12.1	5,557	n.m.[2]
MacMillan Bloedel	698,700	16.8	49,100	529.5
Rolland Inc.	82,084	7.7	1,883	53.7[2]
Scott Paper Ltd.	64,626	2.0	3,299	23.8
Total	**C$3,771,090**	**9.6%**	**C$184,339**	**126.4%**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. **Canfor:** 1985 quarter reported as loss; **Great Lakes:** 1985 quarter reported as loss; **Rolland:** 1985 first-quarter income excluding extraordinary gain from sale of property.

n.m. = Not meaningful.

continued strengthening in pulp and paper prices. Canfor reported lower second-quarter 1986 sales but a big improvement in earnings, racking up a net income of $11.2 million compared with an $8.6-million net loss in 1985.

Speaking for newsprint producer Abitibi-Price Inc., Bernd K. Koken, the company's CEO, said that newsprint and groundwood papers should benefit from strong U.S. consumption and the Oct. 1 price increase, but "highly competitive markets continue to be the norm" in most of Abitibi's businesses.

Domtar Inc.'s pulp and paper products group increased operating profits compared with 1985, when results were hurt by a strike. But Domtar also said "operating profit of the packaging group was significantly lower than in the 1985 quarter, as highly competitive markets lowered selling prices for containerboard and corrugated containers."

Rolland Inc. noted that "selling prices of fine paper are firming up because of cost pressures, but market conditions are still highly competitive." Rolland continues to "emphasize improvement in product mix and cost reductions in order to maintain profit margins at current levels." ■

CAPITAL SPENDING

U.S. paper companies to up spending by 6.7% in 1986

Contrary to U.S. business as a whole, pulp and paper companies are raising their capital spending plans for 1986, according to the latest Commerce Dept. survey done in April and May.

Paper companies are now planning to boost outlays for new plant and equipment by 6.7% to a new total of $9.1 billion for 1986, up from $8.53 billion in 1985. This would be up from a 3.8% increase projected by the Commerce survey conducted in January and February. This is also closer to the 7.8% increase to $9.2 billion reported by McGraw-Hill's spring survey (*P&P*, July, p. 25).

On a quarterly basis, U.S. paper industry capital spending is expected to rise each quarter from $8.63 billion in the first quarter to $8.97 billion in the second quarter, $9.19 billion in the third quarter, and $9.59 billion in the final quarter of 1986, according to the latest Commerce Dept. survey. ■

EXPANSIONS

SFI offering to fund Panama City upgrade

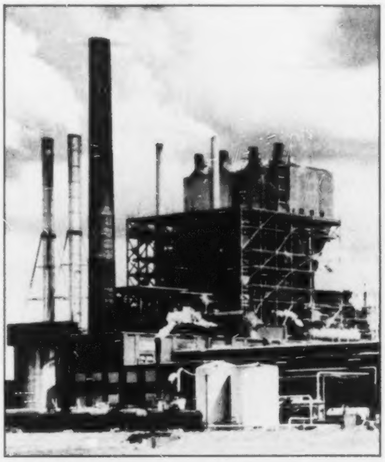
Southwest Forest Industries Inc. will use the proceeds of a public debenture offering to begin a major modernization at its 790-tpd kraft linerboard and 680-tpd bleached kraft market pulp mill in Panama City, Fla., the company announced. The $65-million program will concentrate on the linerboard machine, pulp mill, and woodyard, and it will take about two years to complete.

Panama City's single linerboard machine will be modified to use recycled fiber, adding about 200 tpd to capacity. Other plans include a new digester system for the pulp mill to improve fiber yield for linerboard production and a woodyard upgrade to allow processing of treelength logs.

SFI began studying the Panama City modernization in 1984. Preliminary engineering plans were completed in 1985, but the project was then put on hold due to poor markets for the mill's products. Scaling back oil consumption was a major emphasis of the original program, but the drop in oil prices led the company to refocus the modernization.

Funding for the project will come from a public offering of $135 million of subordinated debentures due Sept. 1, 2001. The offering, expected to close during the third quarter, will also help reduce bank debt and provide capital for improvements at other facilities. Merrill Lynch Capital Markets is the sole underwriter of the offering.

In addition to modernizing Panama City, SFI would also consider the possibility of integrating its market pulp production, chairman and CEO W.A. Franke told attendees at the company's annual meeting early this year. He said that the company would continue to look at the possibility of expanding its corrugated box manufacturing capacity to consume more of its linerboard production.



Strategic restructuring. The proposed debenture offering is the latest step in SFI's move to strengthen its financial condition. To reduce its interest payment burden, the company recently completed an offer to holders of its 10% convertible subordinated debentures to exchange each $1,000 principal amount for 82 shares of SFI common stock. As a result of the offer, the company said that it would incur a noncash, one-time charge of $6.7 million in the second quarter. A preliminary estimate is that $26.1 million of $40 million in debentures outstanding were tendered for 2.14 million shares.

The company recently completed the sale and leaseback of its nine corrugated box plants to Covington Capital Corp. for $23 million in cash and a $3.5 million note (*P&P*, Feb., p. 27). This followed the sale of its Knox Lumber retail building material distribution subsidiary in April for $27.5 million and the sale of 6,500 acres of timberland to a timber trust. ■

Menasha proceeds with upgrade at Otsego mill

Menasha Corp.'s mill located in Otsego, Mich., has broken ground for a $2.85-million warehouse and office complex as part of a $26-million expansion begun in 1980 and scheduled for completion in the fall of 1987.

The two-machine Otsego mill currently has capacity to produce 550 tpd of corrugating medium, and the improvements will add another 100 tpd by the end of next year. A new KMW press section has been installed on No. 1 machine, increasing speed to 2,500 fpm. A new d.c. digital drive system has also been added to No. 1, and improvements to the fourdrinier are slated. A computerized control system was added to the pulp line. ■

ISSUE FOCUS: PREVENTIVE MAINTENANCE ENGINEERING

P&P SURVEY DISCOVERS EMPHASIS ON PREVENTIVE MAINTENANCE HAS GROWN

Responses from 102 North American mills indicate more planning, greater use of computers, and better utilization of contractors

By KENNETH E. SMITH, Executive Editor, and BRENT A. CARPENTER

In June, survey questionnaires were sent to a variety of maintenance engineers and managers in the North American pulp and paper industry asking for information on maintenance practices at their mills. Names were taken from *P&P*'s Pulp & Paper Industry Personnel Census. Responses represented a total of 102 mills producing all major grades of pulp and paper products. Production capacities of these mills ranged from 7,500 to 827,000 tpy. Responses were tabulated and are reported by region in Table 1. (All responses are given in short tons.)

As expected, mills in the U.S. South averaged the greatest annual production capacity, and mills in the U.S. Northeast averaged the least. Mill size did not necessarily correspond to modernity, however, as mills in both the South and Northeast had their most recent paper machine modernization in 1980, on average (Table 1, section A.)

Mills in Canada were the least modern, with the last paper machine modernization occurring in 1977. Canadian mills were also the least productive on a per ton basis in both overall labor hours and maintenance labor hours. Canadian mills required 1.58 maintenance labor hours per ton compared with only 0.69 maintenance hours per ton in the U.S. Midwest, which was the most efficient in terms of maintenance productivity (Table 1, section H).

Not coincidentally, 75% of all midwestern mills report that they conduct regular maintenance force productivity evaluations (Table 1, section B). Canada and the U.S. Northeast, the two least productive maintenance areas, are also the least likely to conduct productivity evaluations (only 47% of all mills in these regions conduct evaluations).

WORK PRACTICES. In addition to mill modernity, work practices are obviously a factor in determining maintenance work force productivity. All Canadian mills reported unionized maintenance work forces (Table 1, section D). Only 13% of Canadian mills reported that flexicraft or multicraft work rules are in effect. Canadian mills averaged 11 maintenance job classifications, and only 20% of Canadian mills reported that operators could do some maintenance work.

In contrast, work practices at southern mills are the most flexible. About 80% of southern mills report unionized work forces. Southern mills average only five maintenance job classifications, and operators can do some maintenance work at 60% of these mills. Flexicraft or multicraft work rules are in effect at 86% of southern mills.

Mills in the Northeast averaged the lowest paper machine availability at 87%, despite reporting the second highest maintenance labor hours per ton of production (Table 1, section B). Availability is generally defined as total available production time (other than downtime required by contract or market-related reasons) minus time lost due to maintenance-related causes (planned and unplanned) divided by total available production time.

Some mills may, however, calculate this figure differently and include all downtime in the calculation. For this reason, respondents were asked to report percent of downtime caused by unplanned equipment failures. These figures ranged between 3% (Canada) and 7% (U.S.

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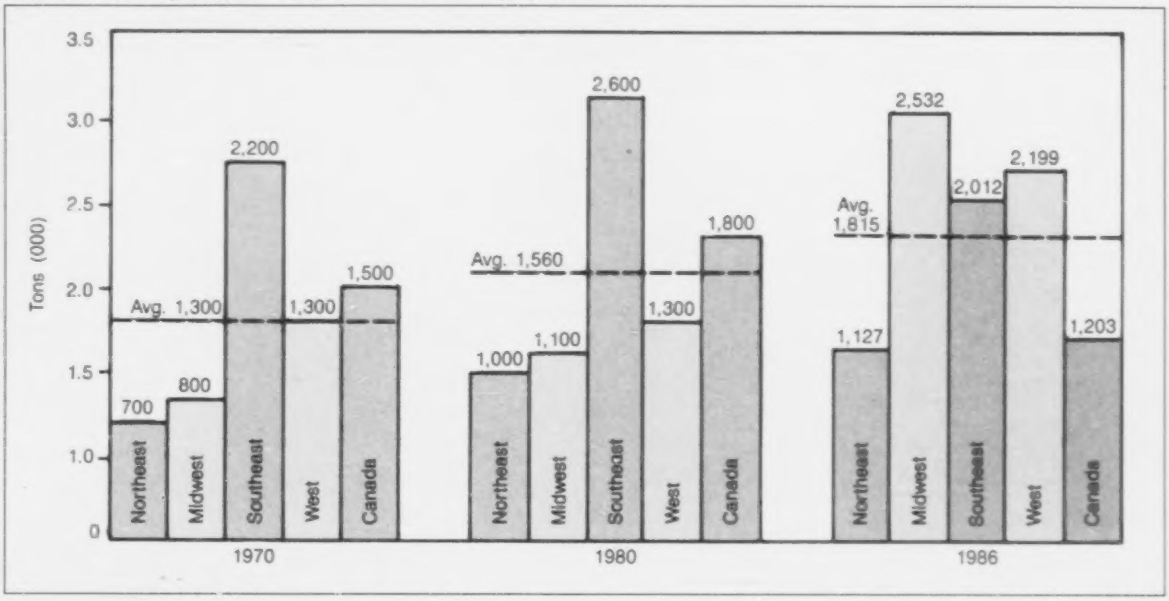
South). All regions report that most maintenance work is planned, with a low of 55% (West and Northeast) to a high of 79% in the South. Not surprisingly, 97% of all southern mills report that planners assist maintenance foremen in scheduling maintenance work, with only 53% of western mills using planners.

TABLE 1: **Survey data summary.**

	Northeast	Midwest	South	West	Canada
A) Mill data					
Mills responding	15	25	28	18	15
Annual production (short tons)	182,643	349,484	382,272	246,268	267,023
Last paper machine modernization	1980	1979	1980	1979	1977
Total employees	770	732	816	420	838
Total maintenance employees	162	138	190	112	222
Total maintenance supervisors	18	12	18	10	21
Total maintenance mechanics	124	119	170	96	156
Maintenance labor hours/year	250,367	240,081	359,037	186,290	421,724
Overtime maintenance labor hours/year	30,450	28,945	41,191	19,507	46,899
Days/year of mill operations	355	354	357	352	345
B) Maintenance effectiveness					
Papermachine availability	87%	94%	94%	93%	93%
Pulp mill availability	90%	95%	95%	93%	94%
Percent unplanned downtime due to equipment failure	6%	6%	7%	4%	3%
Mills that analyze downtime causes	73%	79%	86%	61%	87%
Mills where unplanned failures increased since 1980	20%	9%	0%	6%	16%
Mills conducting maintenance force productivity evaluations	47%	75%	64%	67%	47%
Percent of maintenance work that is planned	55%	67%	79%	55%	58%
Mills with planners assisting maintenance foreman	80%	80%	97%	53%	100%
Mills where maintenance dept. is involved in planning expansions/modernizations	80%	80%	93%	76%	85%
C) Outside contractors					
Percent maintenance budget spent on outside contractors	12%	11%	20%	15%	11%
Mills planning to increase outside contractor use in 1987	60%	42%	25%	17%	23%
Mills that maintain own process control	67%	88%	85%	80%	92%
D) Maintenance work force					
Mills with unionized maintenance forces	93%	96%	80%	88%	100%
Mills with flexicraft or multicraft work rules	53%	50%	86%	60%	13%
Average number of maintenance job classifications	8	8	5	7	11
Mills where operators can perform some maintenance	27%	42%	60%	56%	20%
E) Training					
Average hours/year training for each mechanic	36	45	32	39	34
Average hours/year training for each E/I person	66	64	55	58	48
F) Computerized maintenance					
Mills with computerized work order systems	53%	48%	86%	73%	85%
Mills with computerized spare parts ordering/inventory	67%	84%	90%	73%	77%
Mills with computerized downtime analysis	40%	24%	14%	7%	38%
G) Preventive maintenance					
Mills with a "formal" preventive maintenance program	53%	79%	87%	88%	87%
Percent maintenance budget to preventive maintenance	9%	18%	12%	19%	22%
Average number of preventive maintenance inspectors	3	4	7	5	4
Mills with permanently installed condition monitoring	7%	33%	48%	46%	50%
Unplanned downtime reduction attributed to preventive maintenance system	26%	17%	35%	20%	18%
H) Data evaluation					
Production tpy/maintenance employee	1,127	2,532	2,012	2,199	1,203
Percent maintenance employees/total employees	21%	19%	23%	27%	26%
Maintenance supervisors/100 mechanics	15	10	11	10	13
Maintenance labor hours/ton of production	1.37	0.69	0.94	0.76	1.58
Percent overtime maintenance labor hours	12%	12%	11%	10%	11%

FIGURE 1: **Tonnange responsibility of maintenance employees.**



PREVIOUS SURVEY. In 1980, *Pulp & Paper* conducted a maintenance survey (P&P, Dec. 1980, p. 108) that showed spending on outside contractors averaged 11% of maintenance budgets by mills in all regions. The current survey shows that spending by all mills on outside contractors averaged 14% (Table 1, section C). The South led the way in this area with an average of 20%—possibly due to more flexible work rules and less unionization. Canada and the Midwest (the most strongly unionized areas) reported the least spending on contractors at an average of 11%. Sixty percent of all northeastern mills plan to increase spending on outside contractors in 1987.

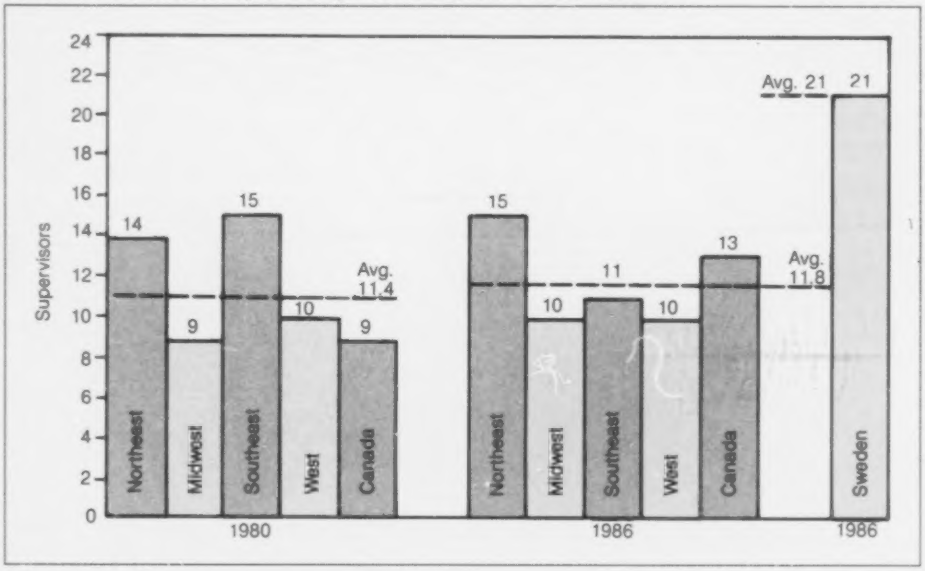
Figure 1 shows the tonnage responsibility of each maintenance employee for all regions in 1970 and 1980 (from the 1980 maintenance survey) as well as figures from the 1986 survey. Generally, maintenance employees in all regions have become more productive except in Canada and the Southeast. Tonnage responsibility per employee for all mills in 1986 averaged 1,904 tons.

The 1980 survey showed an average of 11 supervisors per 100 hourly maintenance mechanics. The 1986 sur-

TABLE 2: **Swedish mill data summary.**

	Korsnäs-Marma AB Gävle, Sweden	**Billerud Uddeholm AB Gruvöns Bruk, Sweden**	**Svenska Cellulosa AB-Ortviken Sundsvall, Sweden**	**Svenska Cellulosa AB-Östrand Sundsvall, Sweden**
Annual production (short tons)	545,000	597,000	594,000	402,000
Paper machine availability	88%	84%	86%	94%
Days/year of mill operations	342	355	349	353
Products	Linerboard Bleached board Bleached pulp	Medium Linerboard Bleached pulp	Newsprint	Bleached pulp CTMP pulp
Total mill employees	1,330	1,280	905	600
Total maintenance employees	440	390	249	250
Total maintenance labor hours/year	697,000	563,300	351,000	324,000
Maintenance labor hours/ton	1.28	0.94	0.59	0.81
Percent maintenance employees/ total employees	33%	30%	28%	42%
Supervisors/100 maintenance mechanics	18	18	20	26
Percent maintenance budget spent on outside contractors	29%	39%	20%	20%
Total maintenance costs ($/ton)	$29.24	$23.24	$18.32	$28.00

FIGURE 2: **Maintenance supervisors per 100 maintenance mechanics.**



vey found that average was holding steady for all mills. By region, the Northeast uses the greatest number of supervisors per 100 mechanics (15), and the West and Midwest use the least (10) (Figure 2).

Computers are increasingly being applied to maintenance applications. The majority of mills in all regions have at least a computerized spare parts inventory/ordering system and probably have a computerized work order system (Table 1, section F). Respondents without computer systems in their maintenance department indicate that implementing a system is a high priority. Computer systems seem to be most widespread in the South, with 90% of mills reporting some type of system.

PREVENTIVE MAINTENANCE. In the area of preventive maintenance, Canadian mills are doing the best job (Table 1, section G). Eighty-seven percent of Canadian mills reported preventive maintenance systems and spent an average of 22% of their maintenance budgets on preventive maintenance. Fifty percent of all Canadian mills said that they have permanently installed condition monitoring systems. Not surprisingly, Canadian mills report the lowest amount of downtime due to unplanned equipment failures (3%). Unplanned downtime reduction attributed to preventive maintenance programs by mills that have them ranged from 17% to 35%.

Table 2 presents data from four Swedish pulp and paper mills for comparison. These Swedish mills spend an average of 27% of their maintenance budgets on outside contractors vs 14% for North American mills. This could account for the high maintenance productivity figures for these mills (0.59 to 1.28 labor hours per ton) since these figures account only for mill maintenance labor.

Also, maintenance workers average 32% of the total mill work force at these Swedish mills compared with an average of 23% for North American mills surveyed. Supervisors per 100 mechanics at Swedish mills averaged 21—significantly higher than North American mills. Could this account for the seemingly higher maintenance productivity of Swedish mills?

RESPONDENT COMMENTS. Comments received from respondents addressed a number of mill maintenance concerns. Many respondents feel that maintenance is not given the support and priority that they feel it deserves. A southern manager said, "Maintenance management is becoming more 'scientific' in its approach as the maintenance department moves from a 'fix it' cost center to a 'preventive' income-protecting center. Most production-oriented people do not really understand this [potential] or maintenance in general." Echoing this theme, another southern manager said, "organized, planned maintenance is the best profit source in the mill. The maintenance system governs machine availability, safety success, product quality, and greatly influences mill profit." A Canadian noted, "Maintenance is considered a necessary evil rather than an investment."

Other respondents commented on the need for greater cost control and planning in mill maintenance. "We are placing greater emphasis on training and control techniques. A full-scale computerized vibration program is being started." Another said, "The general level of maintenance [at our mill] has improved with the implementation of a formalized planning and computer system. To have effective maintenance, an organized disciplined approach to the tasks in mandatory." ■

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PULP & PAPER

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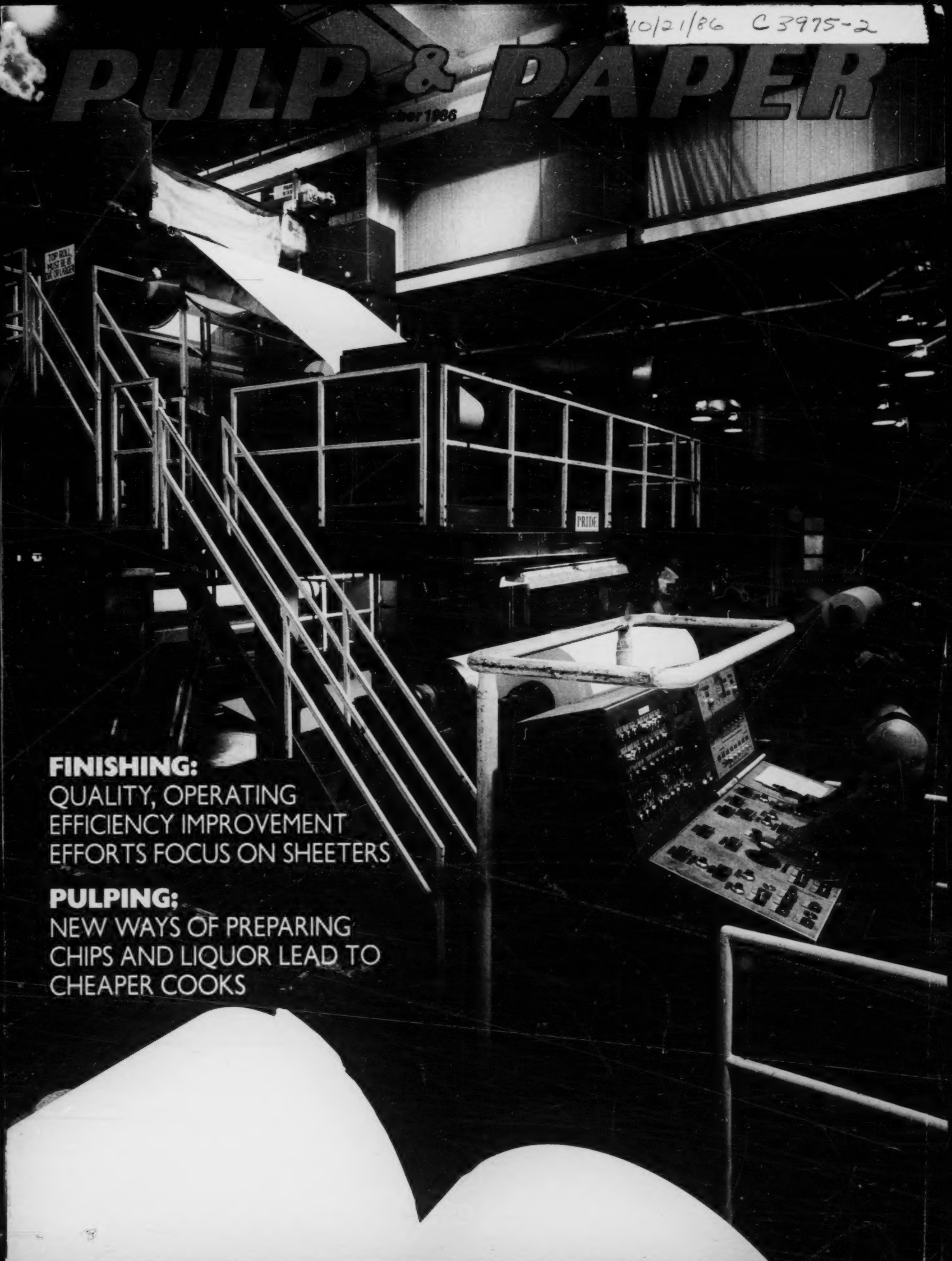

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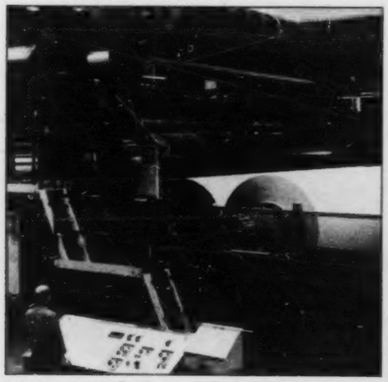

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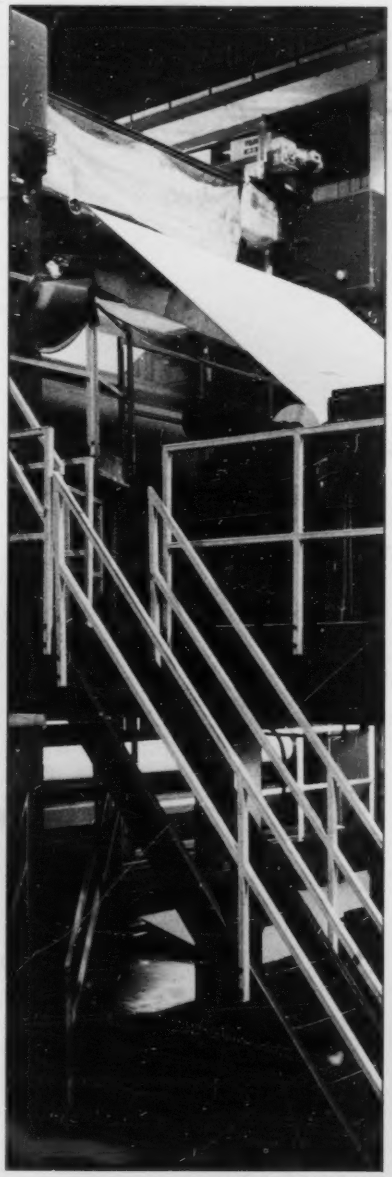

THE COVER

Supercalendering operations at Plainwell Paper Co. Inc. Plainwell celebrated its 100th anniversary this year. P&P will publish an account of the company's evolution during those years in a future issue. (Photo by Kennedy & Green Advertising, courtesy of Chesapeake Corp.)

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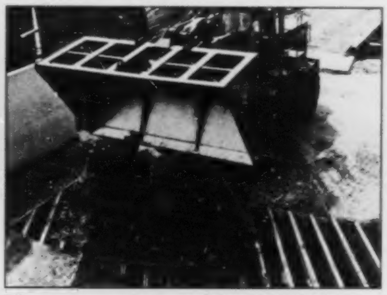

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.

POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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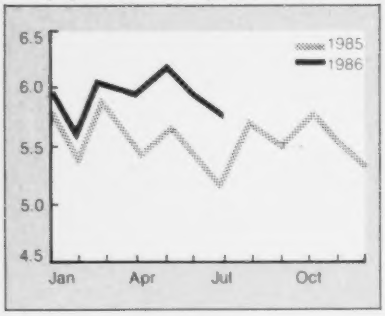
MONTH IN STATISTICS

U.S. paper and board production



U.S. paper and paperboard production in July totaled about 5.7 million tons, up 6.6% from the same month last year, according to American Paper Institute data. Production in July was slightly off the fast pace of June with an annualized production rate of 70.3 million tpy—5.0% higher than last year's total.

Among major grades, bleached paperboard production continued to lead the way with a 17.4% increase over the year-earlier period. It was closely followed by recycled paperboard, which was up 11.2% for the period. Kraft linerboard maintained its healthy pace—it was up 10.4%.

Uncoated free-sheet also showed significant improvement with a 10.1% increase over July 1985. Coated paper is still struggling, but newsprint production is gaining steadily. Tissue had the biggest drop in production—it was down 11.5%. Still, total paper production was 3.1% over the year-ago level.

Canadian newsprint shipments totaled 758,000 tons in June—up 4.0%. Woodpulp shipments did better than that, increasing 10.0% to 678,000 tons for the month. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	July	477	4.2	5,603	2.1
Uncoated groundwood (s)	July	125	7.6	1,493	1.6
Coated paper (s)	July	482	2.6	6,007	−1.2
Uncoated free sheet (s)	July	872	10.1	10,438	8.3
Other printing/writing	July	106	3.9	1,380	2.8
Total packaging and other paper (s)	July	422	2.2	5,153	−0.4
Tissue	July	360	−11.5	4,997	1.3
Total paper	**July**	**2,848**	**3.1**	**35,070**	**2.9**
Unbleached kraft paperboard	July	1,327	10.4	17,455	6.3
Semichemical medium	July	441	7.0	5,300	5.1
Bleached paperboard	July	377	17.4	4,333	10.0
Recycled paperboard	July	637	11.2	8,146	8.1
Total paperboard	**July**	**2,893**	**10.3**	**35,234**	**7.2**
Total U.S. paper and paperboard output	**July**	**5,742**	**6.6**	**70,304**	**5.0**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	June	4,807	8.3	56,873	4.4
Market pulp production	June	481	15.4	7,476	8.6
Wastepaper consumption at paper/board mills	June	1,384	14.2	16,669	9.1
Pulpwood consumption (cords)	June	7,563	8.9	90,846	5.1
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	July	23.976	7.7	163.882[6]	6.2
Containerboard inventories at U.S. box plants and mills	July 1	2,347	−17.3		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	June	897	1.1	11,183	0.2
Imports of Canadian newsprint	June	678	1.6	8,125[6]	−0.9
U.S. paper exports (including products)	June	376	1.9	4,638	16.0
Exports of unbleached kraft linerboard	June	160	4.6	1,986	23.4
Exports of woodpulp	June	372	0.0	4,437	19.9
Norscan pulp inventories[4]	July 31	1,041	−31.2		
Norscan pulp operating rates[4]	July	94%	94%	89%	90%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	July	758	4.0	5,298[6]	1.5
Operating rates	July	96%	85%	93%	92%
Inventories held by U.S. consumers	July 30	1,397	−7.1		
Other paper/board shipments	July	493	15.7	3,468	10.3
Woodpulp shipments (export only)	July	678	10.0	4,519[6]	12.0
Operating rates	July	100%	86%	93%	88%

[1] American Paper Institute. [2] API, Bureau of Census, American Pulpwood Assn. [3] Fibre Box Assn., Paperboard Packaging Council. [4] North American/Scandinavian paper-grade market pulp. [5] Canadian Pulp & Paper Assn. [6] Not annualized. (s) = Shipments.

PAPER-GRADE CHEMICAL MARKET PULP: Declining dollar helps strong price recovery

Grade structure: Paper-grade chemical market pulp is sold in the open market and does not include captive pulp used onsite or shipped to affiliated mills within North America. Pulp is divided into grades based on whether it is made from softwood or hardwood fiber, whether it is produced by the sulfate (kraft) or sulfite pulping processes, and whether it is bleached, semibleached or unbleached.

Northern bleached softwood kraft (NBSK) is the premium pulp grade because of its long fiber length and strength, although papermakers have been making more use of southern pine and hardwoods. Market pulp is sold in sheets, flash-dried bales, or rolls. U.S. paper pulp statistics include more than 1 million tons of fluff pulp used in diapers.

Production/capacity: North American market pulp producers are enjoying a strong recovery this year, thanks to the declining U.S. dollar, which has spurred export demand. The weak dollar has made recent pulp price increases easier for buyers in Europe and Japan to accept and has improved the cost competitiveness of U.S. and Canadian producers vs competitors in Scandinavia.

Heavy buying in anticipation of price increases announced each quarter this year have caused North American and Scandinavian producer pulp inventories to tumble. From a recent high of 1.8 million metric tons in early 1985, producer stocks dropped to a low of around 960,000 tons in mid-1986, but inventories have since risen slightly.

Through the first half of this year, Canadian and U.S. shipments were up close to 14% from a year ago, while Nordic shipments were down 5%. Total Norscan shipments were up 7.9%—a rate that indicates some customer inventory building in overseas markets. Latest statistics, however, indicate that consumer inventories in the U.S. were still at moderate levels. North American shipments are expected to remain fairly strong through the end of the year, but the rate of increase should decline in 1987.

Future outlook: Operating rates for Canadian and U.S. mills are expected to average 92% to 93% this year, up from 86% in 1985. Production at mills in British Columbia in the second half could be affected by the woodworkers strike, which is causing a shortage of woodchips. Plus, Scandinavian mills have been running at only about 82% of capacity so far this year.

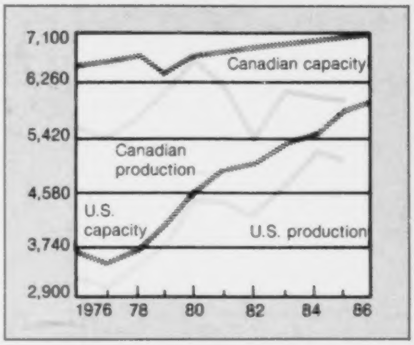
Next year operating rates for Canadian and U.S. market pulp producers could reach 94% to 95% with continued world economic growth. Rates should remain high through the end of the decade with no major capacity expansion planned in market pulp until around 1990. Most of that expansion is expected to be in nontraditional producing countries like Brazil and Portugal.

Pricing: Pulp prices have risen each quarter from depressed levels in the latter part of 1985. The benchmark price for NBSK in Europe tumbled from a peak of $540/metric ton during a British Columbian labor dispute in the second quarter of 1984 to a low of about $380 to $390 in the fourth quarter of 1985. Since then the price from North American suppliers has risen to $415 in the first quarter, $450 in the second quarter, $480 in the third quarter, and an additional price increase to $520 has been announced for the fourth quarter.

Exchange rates have been a major factor behind the price increases. The sharp decline of the dollar this year has wiped out the pulp price rise for customers in Europe and Japan in terms of their local currencies. Another factor that has helped the overall pulp price structure has been the tight supply of hardwood pulp. Hardwood pulp prices in Europe at times have been at the same level as softwood. This has helped push softwood prices up, despite some underlying oversupply from a major round of expansion projects in the first half of the 1980s.

Prices in the U.S. have followed the pattern of Europe, although they have been somewhat weaker because customers have received no relief from exchange rates. Year-end U.S. market pulp prices in $/metric ton for NBSK: 1977, $342; 1978, $375; 1979, $460; 1980, $530; 1981, $530/$565; 1982, $440; 1983, $450; 1984, $510; 1985, $390; 1986 (mid-year), $480. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1984	1985e	1986e
United States			
Production	5,153	5,084	5,540
Capacity	5,469	5,896	5,981
Utilization rate	94.2%	86.2%	92.6%
Imports	2,417	2,296	2,500
Exports	2,559	2,828	3,225
Apparent U.S. consumption	5,011	4,552	4,815
Canada			
Production	5,969	5,968	6,450
Capacity	6,885	6,929	7,024
Utilization rate	86.7%	86.1%	91.8%

e = Estimate.

TOP PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Weyco[1,2,3,5,6]	1,180[a]	9.1
2. Canfor[1,3,4]	590	4.5
3. G-P[1,2,5,6]	590	4.5
4. Parsons & Whit.[1,2]	580	4.5
5. Great Lakes[1,2,3]	575	4.4
6. Repap Enterprises	510[b]	3.9
7. BCFP[1,3,4]	480	3.7
8. MacBlo[1,3,4]	460	3.5
9. IP[1,6]	450[c]	3.5
10. GN Nekoosa[1,2,3]	400	3.1

Market share of top five companies: **27.0%**
Market share of top ten companies: **44.7%**
Total North American capacity (1986):
13.005 million metric tons

1. Bleached softwood kraft. 2. Bleached hardwood kraft. 3. Semibleached softwood kraft. 4. Unbleached kraft. 5. Bleached sulfite. 6. Fluff pulp.

a. Includes 280,000-tpy Prince Albert, Sask., mill acquired from province. b. Includes 405,000-tpy Prince Rupert, B.C., mill purchased from Westar Timber Ltd. c. Reflects planned closure of 200,000-tpy hardwood pulp line at Natchez, Miss., in the fourth quarter.

Note: Several companies with major holdings in the market pulp sector are not shown above to avoid double counting of capacity: Noranda, 610,000 tpy (49% of MB, 50% of Northwood, 100% of Maclaren, 100% of Fraser); Canadian Pacific, 600,000 tpy (54% of Great Lakes, 100% of CIP); and Mead, 345,000 tpy (50% of Northwood, 50% of Brunswick).

Not much new liner expansion seen in near term

Limited capacity growth continues to make the outlook for linerboard supply and demand favorable over the next several years. Not a single new machine or mill in the U.S. is firmly scheduled before 1990.

According to a survey conducted by the American Paper Institute's Fourdrinier Kraft Board Group, which was released around midyear this year, unbleached kraft board capacity is only expected to increase at an average annual rate of 1.2% over the 1987-89 period. Semichemical medium capacity will only increase at a rate of 0.4% per year, while recycled medium shows the fastest growth at 3.5% per year.

Although linerboard prices have recovered substantially, they are still not high enough to justify major capacity expansion projects, according to most industry executives.

As Roger W. Stone, chairman and CEO of Stone Container Corp., noted in a recent speech, "no right-thinking businessman would spend the money to bring on significant additional capacity unless he believed that the price for linerboard, for example, in 1988 would achieve $450/short ton in the U.S. and remain at that level for some protracted period."

Nevertheless, one project promoter argues that lower capital and variable costs have made his new mill project feasible to undertake at a linerboard price of about $350. However, an engineering company executive told *P&P* that it "would be hard to make a new mill profitable at such price levels."

Incremental projects. Most new linerboard projects that are currently being planned involve the rebuilding or conversion of existing machines. The main features of some of the new projects are multi-ply formers, high-pressure press sections, and secondary fiber lines.

Willamette Industries Inc. will be adding 100,000 tpy of linerboard capacity at its Albany, Ore., mill in 1987 through the conversion of a machine currently producing medium to a multi-ply linerboard producing unit. The company will also add 70,000 tpy through a multi-ply rebuild at its Campti, La., mill during the following year (the latter is not included in the survey—see next story). Other large incremental linerboard projects are planned for Boise Cascade Corp.'s mill in DeRidder, La., and Jefferson Smurfit Corp.'s mill in Jacksonville, Fla.

In medium, Chesapeake Corp. is planning to add 125,000 tpy of recycled medium capacity early next year at its West Point, Va., mill through the conversion of a machine that formerly produced linerboard. This project accounts for most of the jump in recycled medium capacity.

Several projects are being studied that could add linerboard and medium capacity. Cascades Inc. may convert the former Nitec Paper mill located at Niagara, Wis., to recycled containerboard production. Temple-Inland Inc. is studying a major program to increase productivity of its recently acquired Orange, Texas, linerboard mill. And Southwest Forest Industries is said to be planning a major overhaul of its Panama City, Fla., mill, which will add approximately 70,000 tons annually to that mill's linerboard capacity.

The latest API Fourdrinier Kraft Board Group survey still includes the Jacksonville Kraft Paper Co. mill, which has been idle ever since October of last year but which may be reactivated sometime next January. The mill has capacity to produce about 350,000 tpy of linerboard.

■ These trends will be discussed further at *Pulp & Paper/PPI*'s Second International Unbleached Kraft Conference, which will be held Nov. 3-4, 1986, at the Waldorf-Astoria Hotel in New York, N.Y. For further information, contact: Karen Swenson, *Pulp & Paper* Seminar Dept., 370 Lexington Ave., New York, N.Y. 10017; telephone: (212) 683-9294; telex: 220442. ■

Major U.S. containerboard expansion projects.

Linerboard	Mill location	Capacity (000 tpy)	Completion
Container Corp. of America	Fernandina Beach, Fla.	265	1986
Chesapeake	West Point, Va.	(256)[2]	1986
Georgia-Pacific	Monticello, Miss.	106	1986
Packaging Corp. of America	Counce, Tenn.	40	1986
Interstate Paper	Riceboro, Ga.	53	1986
Willamette Industries	Albany, Ore.	100[3]	1987
Boise Cascade	DeRidder, La.	65	1987
Longview Fibre	Longview, Wash.	35	1987
Jefferson Smurfit	Jacksonville, Fla.	88	1987
Willamette Industries	Campti, La.	70	1988
Southwest Forest Industries	Panama City, Fla.	70	n.a.
Temple-Inland	Orange, Texas	n.a.	n.a.
Corrugating medium			
Chesapeake	West Point, Va.	125[1,2]	1987
Green Bay Packaging	Green Bay, Wis.	50	1987
Willamette Industries	Albany, Ore.	(100)[3]	1987

1. Recycled. 2. Conversion of liner machine to medium. 3. Conversion of medium machine to liner.
(   ) = Negative.

Willamette to rebuild liner machine at Campti

Willamette Industries Inc. said it will rebuild a linerboard machine at the Campti, La., mill to produce multi-ply linerboard. The conversion is part of a recently approved modernization program at the facility that also includes a new 30-MW turbogenerator for cogeneration.

Conversion to multi-ply will add 70,000 tpy to current capacity of 330,000 tpy. Construction will begin immediately, with completion set for early 1988. The cost of the project was not disclosed.

The linerboard machine at Campti is a 259-in.-trim, 2,000-fpm Allis-Chalmers fourdrinier that was installed in 1974. Improvements to the wet end were made to the unit in 1982, and the dry end was rebuilt in 1982 and 1984.

The Campti project follows closely on the heels of a similar rebuild program at Willamette's Albany, Ore., mill to convert No. 3 machine to multi-ply liner and boost capacity about 94,000 tpy (*P&P*, Apr., p. 25). Late last year, Chesapeake Corp. started up a new three-ply linerboard machine, which is the first of its kind in the U.S. ■

fully supports the present initiative toward freer trade between Canada and the U.S.," as well as further negotiations within the scope of the General Agreement on Tariffs & Trade to eliminate tariff and nontariff trade barriers, he noted.

Stop currency fluctuations. Hall believes that the Canadian government should allow its dollar to float, with the central bank intervening only to "moderate the range of the fluctuations." "Interest rates should not be used to "prop up a weak dollar" so industry doesn't have to suffer from an unpredictable and artificially strong currency, Hall observed.

He also called for federal and provincial governments to work with industry on a comprehensive plan for forest research and management in order to coordinate efforts to ensure fiber quality and bring it closer to the mills.

The industry itself, however, must maintain its competitive position in the future through capital expenditures that keep up with quality and productivity improvements. This will require that "management and labor work jointly to find better ways of coping with technological change," as well as maintaining "pride in their product," Hall said. ■

New newsprint mill may be built in Mississippi

Mississippi Chemical Corp. is studying the feasibility of building a greenfield newsprint mill somewhere in northeastern Mississippi. The company, based in Yazoo City, is a farmers' cooperative producing agricultural chemicals and fertilizer. Net sales were $325 million in 1985.

The location of the mill has yet to be determined, and no details on the size or configuration of the proposed facility are available yet. Other elements of the study include financing, transportation, labor, and potential markets. The study should be completed by year-end, according to company spokesman Tommy Thompson.

Mississippi Chemical's cofounder, Owen Cooper, headed a similar effort to build a newsprint mill in northcentral Mississippi in the early 1980s. Grenada Paper Co. was formed by a group that included Kruger Inc. and a consortium of 13 newspaper publishers to build a $300-million TMP/newsprint facility at Grenada, Miss. ■

FORECAST

Paper and board capacity to grow significantly

Substantial additions in capacity will be needed through 1995 to keep up with rising demand for paper and board, although plastics will continue to compete in certain markets, while electronics will have both positive and negative effects, according to a recently completed study by Freedonia Group Inc., a Cleveland, Ohio, database-research firm formed last year.

Citing other factors likely to affect the paper industry in the next decade, the report, called *Pulp and Paper to 1995*, notes that the restructuring because of divestitures and acquisitions will continue. The industry's fiber furnish needs will continue to be met primarily by woodpulp, output of which is expected to exceed 72 million tons in 1995 from 55 million in 1985, the study notes.

Wastepaper use, however, will remain at about 23% of fiber furnish due to the high cost of collection and the plentiful supplies of pulpwood. Growing and harvesting techniques are expected to improve, assuring a steady flow of pulpwood and increasing demand for sulfate pulp, Freedonia indicates.

U.S. demand for paper and board will continue to lag growth in real GNP, increasing just 2.6% annually over the decade, but consumption will rise to 100 million tons by 1995. Paper production will approach 47 million tons, rising 3.2% annually from 34 million tons in 1985, as a result primarily of the growth in business papers and a rising share of U.S. produced newsprint.

Beyond the mid-1990s, however, the growth in printing and writing papers will weaken as nonpaper media such as microforms, compact discs, and electronic media become more sophisticated, the study notes. Long-term demand for paper will also be stunted by the saturation of the consumer tissue market and the strides made by plastic packaging in some sectors. In addition, continued weight reduction of paper-based products as a result of advances in low-density technology will also heighten competition over the next decade.

Paperboard production is projected to rise 2.3% annually, reaching nearly 42 million tons in 1995, according to Freedonia. Inroads by plastics will curtail the growth of various

U.S. paper and pulp outlook (000 tons).

			% annual growth	
Item	**1985**	**1995**	**1975-85**	**1985-95**
GNP ($ billion, 1982)	3,571	4,890	2.3%	3.2%
FRB index (1977=100)	124.5	178	2.6	3.6
Population (million)	238.8	260.5	.94	.87
Paper and paperboard				
Consumption	76,629	99,325	1.8	2.6
Net imports	7,595	9,375	—	—
Production	69,034	89,950	1.6	2.7
Paper	34,044	46,800	2.3	3.2
Paperboard	33,190	41,850	1.4	2.3
Construction grades	1,800	1,300	−4.9	−3.2
Fiber requirements	**70,575**	**92,150**	**1.4**	**2.7**
Woodpulp	53,975	70,700	1.4	2.7
Wastepaper	16,200	21,100	1.7	2.7
Other fiber	400	350	−5.5	−1.3
Woodpulp requirements				
Ton pulp/ton paper and board	0.782	0.786	—	—
Pulp consumed in paper and board	53,975	70,700	1.4	2.7
Fluff and other pulp and inventory	1,750	2,150	—	—
Total pulp consumed	55,725	72,850	1.6	2.7
Net imports	675	700	—	—
Woodpulp production	55,050	72,150	1.7	2.7

Source: Freedonia Group, Inc.

packaging grades, but strong overseas demand for linerboard and other containerboard, as well as for unbleached kraft, will boost the output of board.

Construction paper and board demand, however, is expected to continue to fall off due to competing materials and a weaker residential construction market projected over the next ten years. ■

LABOR

CPU approves reopening merger talks with unions

The Canadian Paperworkers Union will again explore a merger with other forestry and paper industry unions in Canada, following the union's biannual convention in St. John, N.B., a CPU spokesperson said. CPU's president, James M. Buchanan, was also reelected to another two-year term, which will expire September 1988.

Delegates to the convention gave union leaders a mandate to open merger negotiations with all of the other forestry and paper industry unions throughout Canada. Included in this group would be the Pulp, Paper & Woodworkers of Canada, International Woodworkers of Canada, Confederation of National Trade Unions, Lumber & Sawmill Workers Union, and Energy & Chemical Workers Union.

In 1982, a proposal to merge with the ECWU was rejected by 52% of CPU delegates. Buchanan had recommended the merger to compensate for loss of CPU members.

In the U.S. last year, a merger proposal between the Oil, Chemical & Atomic Workers Union and the United Paperworkers International Union was approved by OCAW but later rejected by a 63.5% vote of UPIU delegates (*P&P*, Jan. 1986, p. 31). ■

Strikes end at James River, Thilmany Pulp, and PCA

Members of the United Paperworkers International Union agreed to a new contract at James River Corp.'s 400-tpd paper mill at Parchment, Mich., and its 450-tpd recycled board mill at Kalamazoo, Mich. The new three-year agreement was ratified Aug. 30, ending a strike that began July 24.

The contract, effective Sept. 2, has no wage increase in the first year and increases of 2.875% and 2.875% in the last two years. In addition, three health maintenance organization alternatives to the modified company medical plan were offered to the workers. One of the issues in the strike had been the company's intention to implement a comprehensive medical plan that would raise employee contributions for health care. The contract expires July 22, 1989.

■ UPIU employees ratified a three-year contract at **Thilmany Pulp & Paper Co.**'s 555-tpd special industrial papers mill in Kaukauna, Wis., ending a strike that began Aug. 8. The new agreement calls for wage increases of 0%/2%/2% and improves pensions and other benefits. In addition, the company can operate the mill on all holidays except July 4 and Christmas. The contract was effective Aug. 1 and expires July 31, 1989.

■ A new three-year contract was approved by UPIU workers at **Packaging Corp. of America**'s molded pulp mill at Plattsburgh, N.Y. The mill had been struck Aug. 15. The agreement gives workers a $500 lump sum payment and a 3% wage increase in the first year and increases of 3% in each of the next two years. The contract is effective Aug. 29, 1986, and expires July 31, 1989. ■

K-C cuts 355 from Terrace Bay, Ont., work force

Kimberly-Clark Corp. said it would cut 255 full-time and 100 part-time workers from its Terrace Bay, Ont., mill and Longlac, Ont., woodlands work force immediately to reduce losses and avert a closure. Earlier this year, the company had indicated that some action would be needed to justify keeping the operation open.

At the mill, a work force of about 1,000 will be cut by 206. The woodlands operations would lose 49 employees, and the remaining staff of about 750 will be layed off during a two-month curtailment as of Sept. 2, the company said. Early retirement will be offered to 109 eligible employees prior to the layoffs.

A close source said that further cost-cutting steps would be considered in 1987 and would depend on the company's wood requirements. The current "survival plan" is expected to bring costs in line at the 1,250-metric-tpd bleached kraft market pulp mill in Terrace Bay but would only partially offset high costs in the woodlands operations.

The mill lost C$78 million over the past eight years, including C$17 million in 1985. Also, K-C has been using less of the mill's output to supply its U.S. tissue mills, requiring only 55% of last year's production. The trend was to use more eucalyptus pulp.

At K-C's annual meeting earlier this year, company chairman and CEO, Darwin E. Smith, said,"our investment in Canada is totally out of proportion to the income from that investment," noting that "alternate solutions" were being weighed. ■

LABOR BRIEFS

■ **Weyerhaeuser Co.** has reached an agreement with members of the UPIU, IBEW, and International Union of Operating Engineers at its 1,950-tpd containerboard and fine papers mill at Plymouth, N.C. The new contract was ratified Aug. 23 and calls for wage increases of $1,200/3%/2.5%. In addition, it removes operating restrictions for Dec. 24-26 and contains flexible work rules. The contract runs from Aug. 1, 1986 to July 31, 1989.

■ Members of the UPIU ratified a new three-year contract with **Brunswick Pulp & Paper Co.** at the company's 400-tpd bleached kraft mill at Brunswick, Ga. The agreement, effective Aug. 1, calls for an undisclosed lump sum payment in the first year and 3% increases in the next two years before expiring on July 31, 1989.

■ A new three-year contract was ratified by UPIU members at **Potlatch Corp.**'s 535-tpd bleached paperboard mill at Cypress Bend, Ark. The agreement calls for wage increases of $1,000/3%/3%, eliminates operating restrictions for Dec. 24-26, and institutes a comprehensive medical plan. The contract is effective Aug. 1 and expires July 31, 1989.

■ **Champion International Corp.** concluded negotiations with UPIU employees at its 720-tpd printing papers mill at Sartell, Minn., and its 1,100-tpd linerboard mill at Roanoke Rapids, N.C. The Sartell contract is effective June 2, 1986, and calls for lump sum payments of $1,100 to production workers and $800 to maintenance workers in the first year, a 37¢ increase in the second year, and a 2.5% increase in the last year. Roanoke contract's gives workers $1,000 in the first year and increases of 37¢ an hour and 2.5% in the last two.

ALKALINE PULPING: Price, equipment influencing use

TABLE 2: **Canadian demand for kraft chemicals, metric tons.**

Chemical	Kraft pulping	All P&P	All industry	Price[1]
Saltcake	237,000	265,000	300,000	$85/ton
Caustic	230,000	910,000	1,516,600	$225/ton[2]
Lime products	240,000	500,000	1,955,000	$60/ton[3]
Defoamers	11,000	16,000	—	$1.00-1.30/lb

1. All prices are in Canadian dollars and represent list prices.
2. 50% solution, f.o.b. works, freight equal.
3. Quicklime, f.o.b. Ontario producing points.

Cooking. Sodium sulfate, or saltcake, is in a continuing state of flux regarding its use in pulp mills. Consumption levels, related mostly to the production of kraft pulp, have been tough to track during the 1980s due to market influences such as competing products, price, and supply. The main use of saltcake in pulping is as a recovery loop additive for balancing sodium/sulfur levels. Recently, these have been substituted with emulsified sulfur, caustic soda, and soda ash. Chief factors have been price and, less so, convenience.

Prices for pulp-grade saltcake are currently $55/ton, f.o.b. works, with reportedly firm prices in the Southeast, where demand is steady, and discounts of 10% to 20% appearing elsewhere in the U.S. and Canada. These prices represent a decrease from last year, but saltcake's competitive position did not improve as the prices of competitive products are depressed too. Overall consumption for the industry will remain near last year's level of just under a half-million short tons (one-third of a million metric tons in Canada), with the best forecasts calling for zero or negative growth for the remainder of the decade. Some saltcake may find its way into high-yield operations—maybe in Canada—but not enough to offset losses from competing products.

Adjustments such as lowering sulfidity, which is becoming more attractive with improved digester control, will also curtail use of saltcake and increase consumption of emulsified sulfur and caustic in production. The supply of saltcake is also slimming a bit, as more producers adjust to the soft demand situation by upgrading their products for use in other markets. One example is the decision of Courtaulds North America Inc. to produce a higher-quality sodium sulfate grade from its Mobile, Ala., plant for purity levels required by detergent and textile consumers.

Demand for pulp additives like defoamers and specialty chemicals is strong, according to most suppliers. Overloaded washers, more use of lower-quality wood, and generally strong operating rates are the factors involved in their strong consumption.

Defoamers, added to the brownstock washing system at the knotters, vat showers, or screens, are applied from 1 lb/ton (for a newer or very efficient system), to more typically between 2 and 4 lb/ton, up to several pounds per ton for a system that is operating above capacity. Softwood operations tend to be on the high end, while hardwood operations consume somewhat lower amounts. Efforts by equipment manufacturers (most notably Black Clawson, with documentation by Georgia-Pacific) have helped curtail defoamer use by developing new-design washers. Sunds and Impco have also developed new types of washers.

TABLE 1: **U.S. demand for kraft chemicals, short tons.**

Chemical	Kraft pulping	All P&P	All industry	Price
Saltcake	425,000	450,000	1,000,000	$65/ton[1]
Caustic	355,000	1,820,000	10,400,000	$175/ton[2]
Lime	556,000	1,112,000	15,000,000	$45/ton[3]
Defoamers	18,000	25,000	—	$0.80-$1.00/lb

1. Bulk purchase, 100% basis, f.o.b. works, East Coast; West Coast price add $10.
2. 50% solution, Gulf Coast works, freight equal.
3. Quicklime, bulk f.o.b. plants

These washers are said to dramatically cut defoamer use in hardwood operations, while somewhat reducing consumption in softwood applications. Market acceptance has been slow, and no real impact on defoamer consumption will be evident soon.

Specialty items, having been pursued by suppliers recently due to favorable pricing, are appearing more frequently in pulp processing. Products for pitch control, microorganism control, and pulp dispersion are all being applied, typically on a customized basis. Furnish seems to be a large consideration in applying most of these products. Growth will continue for them as more inferior wood is processed and water system closure becomes more common.

Recovery. Limestone and pebbled lime are typical inputs for replacing calcium lost during kraft recovery operations. The recausticizing loop begins at the lime kiln, where carbon dioxide is driven off calcium carbonate to form calcium oxide (lime). About ninety percent of the lime is recovered, mixed with makeup and sent to a slaker, and combined with dissolved smelt to form white liquor. Development in slaking, elevating temperature and pressure, is being conducted overseas.

Demand for lime is tied to production levels, while price is often controlled by other facets of the economy, like steel production. Usage trends do not seem to be varying much with regard to new equipment, lime product employed, etc., so consumption patterns will probably follow production of kraft pulp closely. ■